

PROGRAM OF RESEARCH ON THE MANAGEMENT
OF RESEARCH AND DEVELOPMENT

Department of Industrial Engineering and Management Sciences
The Technological Institute
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AN EXPERIMENT IN MEASURING CERTAIN
ASPECTS OF THE INFORMATION-SEARCHING BEHAVIOR OF
X-RAY CRYSTALLOGRAPHERS

Technical Report No. (1)

October, 1965

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ABSTRACT

A set of Information Services was presented to several scientists while their information-searching behavior was being observed. Information Event cards were completed in real-time by the scientists to describe their information behavior. A telephone tape recorder system was used to collect critical events. A questionnaire and interview were used to obtain personal and organizational background data. The reactions of the scientists to the set of Information Services are described.

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65/37 This work has been supported by Grant NSG-495 from the National Aeronautics and Space Administration.

FACILITY FORM 602

N70-7640 4	_____ (THRU)
(ACCESSION NUMBER)	<i>None</i> (CODE)
<i>92</i>	_____ (CATEGORY)
(PAGES)	
<i>CR-113534</i>	
(NASA CR OR TMX OR AD NUMBER)	

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AN EXPERIMENT IN MEASURING CERTAIN ASPECTS OF THE INFORMATION-SEARCHING BEHAVIOR OF X-RAY CRYSTALLOGRAPHERS *

by Richard W. Trueswell
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Introduction:

This report describes a study of some aspects of the information-searching behavior of x-ray crystallographers which was conducted during the summer of 1965 by a group in the Department of Industrial Engineering and Management Sciences of Northwestern University. Data were collected from industrial and non-industrial research laboratories in the Chicago area. The participants in the study were scientists and engineers working in the field of x-ray crystallography. This report contains all details of the study except for the post test scheduled for January, 1966. The study is part of a series of field studies on the information-searching behavior of researchers. A survey of the state of the art in such studies was made by Werner (1965).

The field of x-ray crystallography was chosen for study of some aspects of the information-searching behavior of researchers for two reasons. The field is reasonably well organized and some recent breakthroughs have occurred in it. Several data-collecting instruments were used to provide information about the information-searching behavior of the participants. A set of Information Services was provided at approximately the half-way point in the study to these individuals in an effort to obtain some information about the effects on the individual of a change in his information environment. While the services were chosen because of their potential utility to researchers in the field, no attempt was made to compare their value or to develop a rating of the services, although questions were asked of the participants about their feelings toward the services.

A post interview is scheduled for 6 months after the initial study, and at that time data will be collected on the further use of the Information Services. Certain aspects of any changes in the information-searching behavior of the participants will also be measured. The post interview is directed toward determining whether or not the experiment has affected the information-searching behavior of the researchers and the extent to which they used the Information Services provided them at the beginning of the experiment.

Methodology:

The basic study design included these steps:

*"x-ray analysis of crystal structure: Max von Laue in 1912 showed that the planes of atoms in crystals act as a diffraction grating to x-rays, which are scattered by them and provide an accurate means of determining the details of the internal atomic structure.

crystallography: The study of the forms, properties, and structure of crystals." (Chambers's Technical Dictionary, 1959)."

1. Description of some aspects of the information-searching behavior of the participants;
2. Introduction of a change in the information environment
3. Measurement of the effects of these changes on the behavioral aspects measured prior to the change
4. Comparison with other similar groups

Data were collected during a continuous 4-week period, except in one case when it was interrupted by a vacation.

Nine organizations were studied, with two participants in each organization. These organizations, with one exception, were research-oriented. The one exception was related more to the manufacture of x-ray crystallography equipment, although the individuals studied in this organization were concerned with information-searching in the field of x-ray crystallography.

At the beginning of the study, a preliminary written questionnaire (Appendix A) was administered to collect basic background data about the individual and to determine some aspects of his information-searching behavior and environment. A similar questionnaire was administered at the closing of the 4-week period. This closing written questionnaire consisted of two forms: a 5-page written questionnaire (Appendix B) and a 50-minute (approximate), semi-structured administered questionnaire (Appendix C). A 6-month follow-up interview is planned, but has not been completed at this time.

At the beginning of the study all participants were provided with 3" by 5" cards and were given both written and verbal directions for completing the cards. In effect, they were told to complete one card each time an information event occurred (Figure 1 shows an Information Event card). Two weeks after the start of the study a set of Information Services was provided to half of the participants. Seven Information Services were offered to these participants (Figure 2).

These services were presented to one of two participants in each of 9 organizations. He was told that they were presented to him "in the subject's natural environment" and that it was up to him to use the services or not, or even to open the sealed folders. He was also told that these services could be shown to anyone else in the organization and that requests for the services by other individuals would be honored, if presented through the participant. Where appropriate, each service had an order form.

The closing verbal interview (4 weeks after beginning of study) was tape-recorded, and handwritten notes were taken. At the end of the closing interview, the participant was advised that he could keep the set of Information Services and use them during the next 6-month period if he desired.

A post interview 6 months after the closing interview will be administered to the individuals in order to explore any further changes in their information-searching behavior and their reaction to the study and the services during the time period.

Figure 3 is a copy of the PERT* network used in the planning of the information-searching experiment. This approach was necessary in order to maintain the critical time scheduling necessary for the short duration of the main portion of the study (4 weeks).

Procedural Details:

In order to describe the procedural details followed in this study, we will trace the procedure for one set of subjects at a given organization.

Initial contact was made through either the individual himself, an executive in the company, or laboratory management. The researcher was approached directly in the non-profit or educational organizations, because it was felt that he would be able to and would wish to decide about his own participation in the study, a situation particularly appropriate at educational institutions. In the case of industrial companies, it was necessary to gain access to the individual through upper management, and then to obtain the researcher's willingness to participate in the study. In all cases an attempt was made to get two individuals in each organization who had comparable activities in the same technical field.

The first step of the study was the delivery of the Information Event cards and the instructions to the participants. The participants were requested to read the 3-page set of instructions (Appendix D) in the presence of the interviewer and were required to complete one Information Event card for an information event that had occurred that day. Pre-addressed, stamped envelopes were provided so that the participants could mail back the cards at the end of each working day.

A telephone with an automatically keyed tape recorder was installed at Northwestern University for the purpose of recording messages from the participants in relation to their information-searching behavior,** in view of any unusual or special information-searching activities. The participants were asked to dial the given telephone number and were told that after hearing a "beep" they could proceed to describe the information event and the details related to it. The system operated 24 hours a day, 7 days a week. Only one telephone number was given to the participants, but multiple recording devices and automatic switching to them was available for incoming calls. The telephone equipment was monitored by graduate students, and the incoming calls were logged daily.

At the same time that the Information Event cards were delivered, a preliminary questionnaire was administered to each of the participants. This written questionnaire (11 pages) collected background information about the individual and about some aspects of his information-searching behavior and

*PERT - Program Evaluation Review Technique is one of several ways of scheduling programs for optimal results.

**See Werner, D., Masters Thesis, Northwestern University, 1965.

environment. Most of the questions were taken from previous or current research studies in the field of researchers' information needs and behavior.

The experimenters tried to minimize the data-collecting interruption of the participants' normal work activities. The following schedule was followed: a one-hour preliminary interview; a 45-minute closing interview at the end of the study; and a 30-minute post interview 6 months later. A tolerance of 15 minutes was placed on these figures when explaining the study to prospective participants. In most cases these limits were not exceeded.

The Information Event cards require approximately 30 to 45 seconds each for completion and were not considered a burden on the individual's time. However, if a burden did exist, it was that of maintaining an awareness of the necessity for completing the cards.

The "information event" was defined as any occurrence when information is related to the participant's professional activities. The information may be some aspect of current awareness (or background) information, or it may constitute a specific piece of information usable in the participant's current activities. A single card was used for the recording of each information event. In the event that the participant was making continual references to a handbook (or other similar activity), he was instructed to answer all questions on the card only once, with the exception of question number 6. In this question he would make multiple checks, one for each information event that occurred. In this way it was not necessary for the participant to record repeatedly that information which would be the same for each reference to the handbook.

A FORTRAN computer program was prepared to process the data punched from the Information Event cards as they were returned. The program prepared a frequency count of the replies for all subjects and listed them separately for non-industrial, industrial research organizations, control, and test subjects. Totals are provided for each of the appropriate headings. These figures will be discussed in the "Results" section of this report. A second portion of the program normalized the frequency counts. Average values and expected values are provided for each of the categories on the Information Event card, and in the cases of items 4 through 7, conditional probabilities are also provided.

The choice of pairs of participants was made so that a "test"* participant and a "control" participant would be available in each organization. The test participants were provided with the set of Information Services and were advised that they could show any or all of the services to the control participant if they so desired. It was also possible for the control participants to request from the test participant any or all of the items in the set of Information Services. A description of the Information Services is included in the Appendix.

* The terms "test" participant and "control" participant are not used in their typical statistical experimental connotation, but simply refer to the initial receipt of the set of information services.

At the end of the 2-week period, the closing interview was administered, and the participants were advised that they could use these services during the next 6 months, again under the same circumstances that were originally specified. They were also reminded that a post interview would be administered approximately 6 months later.

Information Services:

The package of Information Services was provided to each of the "test" participants. In all cases, each one of the individual services was enclosed in a manila pocket-type folder and sealed. An instruction sheet (Appendix E) was secured to the outside of each folder, making it possible for the participant to have a summary of the contents of the folder without actually opening it. If the folder was opened, it was necessary to break the seal. The Information Services were delivered with the instructions that the participant could use the services if he so desired. He was also instructed that if he wished, and thought appropriate, he could show any of the services to the other participant in the study.

The experimental services were:

1. National Referral Center: This service permitted the participant to make 3 long distance telephone calls to the National Referral Center. There was no charge to the participant for this service and a third party telephone calling procedure was utilized. These charges were billed to a telephone number assigned to the research study.
2. National Aeronautics and Space Administration Information File Search: This service permitted the individual to request a complete computer file search of an information retrieval system operated by The National Aeronautics and Space Administration and containing Scientific and Technical Aerospace Reports and International Aerospace Abstracts documents. All that was required of the individual was to check off the appropriate descriptors for his interest patterns. The form (Appendix E) could then be mailed by using the enclosed envelope.
3. Publications of a National Research Laboratory: A copy of the booklet "Laboratory Publications," from a large national research library, was enclosed in this folder and an order blank (Appendix E) was provided with which the participant could order any of the publications listed in the booklet.
4. Library Acquisitions of a National Research Laboratory: Copies of any acquisition would be made available if desired by the participants. An order form was enclosed with the service.
5. Current Contents: Enclosed in the folder was one copy each of Current Contents (space, electronic and physical sciences), Current Contents (chemical, pharmaco, medical, and life sciences), and Index Chemicus. These publications were provided by the Institute for Scientific Publication. Again, the individual was permitted to order any of the documents in these publications or to make use of them in any way he desired.

6. Reprints of Contents of Crystallography Journals: Reprints were provided of the table of contents for current issues of the 3 crystallography journals: Acta Crystallographica, Soviet Physics Crystallography, and Zeitschrift für Kristallographie. An order form for requesting any of the articles in these journals was also provided.
7. University Microfilms Dissertation Bibliography: A bibliography of dissertations relating to x-ray crystallography was enclosed, and the participant could order any one of the dissertations he desired.

Participants:

The participants in this study were scientists and engineers using the techniques of or working in the field of x-ray crystallography, either in industrial or non-industrial research laboratories. In each of the organizations an attempt was made to select a pair of individuals whose work was parallel. One of these individuals was to serve as a "control" and would not receive directly the set of Information Services. The total population was made up of 9 organizations within a 100-mile radius of Chicago and included 4 non-industrial organizations and 5 industrial organizations.

The 4 non-industrial sets of participants were from one academic laboratory and one government-research laboratory. The 5 industrial organizations included 3 research laboratories, one consulting firm, and one manufacturing firm. All individuals in the industrial organization were research-oriented. The participants from the manufacturing firm were more production- and marketing-oriented than the other participants.

The typical* participant (Appendix F) may be described as a 39-year-old man who has been employed at his company for approximately 8 years. If he works in an industrial firm he is likely to have obtained a Master's Degree; in a non-industrial organization a Ph.D. is more probable. He is a member of 3 professional societies, the most common being the American Chemical Society, the American Crystallographic Association, and the American Society for Metals. The participant has usually obtained significant information when attending technical meetings, especially through paper-reading sessions and informal discussions. He has, on the average, made 2 visits to other labs in the past year. Visiting lecturers are scheduled regularly at his place of work. Although he usually has two assistants, they do not route material for him, and he generally does not use them to search for information. The library services which the participant uses most often are information and reference services, inter-library loans, and photographic reproduction and duplication facilities. He feels that his two most valuable ways of gathering information are scanning or reading journals and informal discussions with colleagues.

The preceding descriptors refer to both the industrial and non-industrial

*These are essentially modal or typical values and represent quantitative and qualitative source data.

participants in this study. In other aspects of their information-searching and research habits, however, important differences are found between industrial and non-industrial scientists. The non-industrial researcher for the most part determines his own work and is willing to discuss it. He regularly reviews each issue of 2 of the 5 leading journals in the field: Acta Crystallographica, and Zeitschrift für Kristallographie. He has also used Chemical Abstracts an average of 5 to 10 times in the past 12 months, but he has never heard of Current Contents. He is familiar with work currently being done abroad in this field, and he has authored or co-authored an average of 3 journal articles and 3 technical reports or bulletins in the last 12 months.

The research of the industrial worker, on the other hand, is principally determined by his superior, and he is reluctant to discuss it. Of the same 5 periodicals mentioned above, he does not regularly review any, although he has read articles in Acta Crystallographica and has heard of Zeitschrift für Kristallographie. Like the non-industrial worker, he also uses Chemical Abstracts but not Current Contents. In contrast with the non-industrial worker, he is not familiar with current foreign work in the field, nor is he on any mailing list. He has authored or co-authored an average of 20 technical reports or bulletins in the last 12 months, but no journal articles.

Results:

The results of this phase of the study are divided into 3 categories: information-searching characteristics, treatment reaction, and post-treatment interview. Much of the data will be found in tabular form in the appendices as noted below.

Information-Searching Characteristics:

The total number of events recorded by the industrial group was approximately twice the total number recorded by the non-industrial group. Between 60% and 80% of the information events for all subjects occurred in the participants' offices or the immediate vicinity. No significant differences were noted in this latter statistic when industrial and non-industrial categories were compared. A "previously used" information source was usually referred to about twice as often as a new source; the exception to this was the control group of the non-industrial category, which showed the reverse of this finding during the pre-test. No explanation is available for this difference.

All participants recorded "specific problems" as the most frequently occurring class of event, followed by "current awareness." Approximately two-thirds of the events recorded were of the specific problem class, with the remaining third made up of current awareness events. This finding is comparable with that of Trueswell (1964) in his study of individuals making specific title searches compared with subject matter searches. No significant differences were found between the industrial and non-industrial, or the pre- and post-test categories, nor were any significant differences found between these categories when documents used were compared. Approximately one-third of the information events in which documents were used were of the "glanced-over" category, while 10% to 15% of the document information events involved more careful study.

"Personal contact" events were usually of the "face-to-face" category. The industrial group reported a larger proportion of face-to-face events than did the non-industrial group. Of the personal contact events, approximately 50% involved short or extended conversations, approximately 20% of which occurred at meetings of 3 or more people. About 60% of the information events originated with the individual and 30% of them were indicated by others.

While only these slight changes were noted in the general pattern of information-searching behavior of the participants after the administration of the set of Information Services (approximately 2 weeks after initiation of the study), in general, the total number of information events dropped appreciably (30% to 50%) for the second half of the test. However, if the individual data records are noted, in some instances certain participants recorded a larger number of information events after being exposed to the Information Services, thus giving some possible indication that his searching behavior was affected. It might be concluded that in some cases the individuals were made more aware of information events by the very nature of the experiment, although this would not be typical of all participants.

Appendix G contains a tabulation of the information event characteristics, showing the pre- and post-test results. Both frequency and probability data are provided. Appendix H contains the same information tabulated for non-industrial and industrial groups.

Approximately 4 information events were recorded daily for each participant. Appendix I contains cumulative distributions of the number of activity cards for each participant. It should be noted that while the number of Information Event cards submitted decreased considerably after the treatment was delivered, this factor might be attributable to a decrease in interest in participating in the program. "Controls" who did not receive the set of Information Services until a few days to a week after the experimental subjects, still submitted a decreased number of Information Event cards after the treatment date.

Treatment Reaction:

Possibly one of the more interesting results is that no significant changes occurred in the information-searching behavior as measured by this study after the set of Information Services was administered. In the set of 7 Information Information Services provided for 2 weeks to each participant with the understanding that he was not required to open or to use the services, in only two cases were all 7 services opened. A third control participant did look casually at all of the services, but did not spend more than one or two minutes with each one. The services were used in only 11 out of 105 possible instances. All participants, regardless of whether they opened the folders or not, indicated that at least one or more services would be desirable and that they would like to continue to receive the specific service or services.

Except in one instance, the participants indicated that they would like to continue to receive a reprint of the Table of Contents of the crystallography journals (Information Service 6). Current Contents (Information Service 5) and the University Microfilm Dissertation Bibliography (Information Service 7) were rated equally in terms of the most desirable services to continue. The National Aeronautics and Space Administration information file computer search was listed

as second from last. Services 1 and 3 tied for last place. In almost every case the participant's main reason for not using the service was that he did not have sufficient time. A second reason was that a particular service would not be of value for one reason or another. However, in some of these cases, the individuals had never used the service before and therefore did not, in fact, know how valuable the service might be. Two-thirds of the participants opened only 4 or fewer of the services provided. The remaining third opened 6 or more of the services. Appendix J is a tabulation of the reactions of the individuals to the set of Information Services.

Conclusions and Implications:

Probably the most interesting result of the study was the fact that so few of the participants actually used or even opened the Information Services during the 2-week period. In a few cases specific reasons existed for not opening some of the folders; however, in the remainder of the cases the individual simply did not care to open them. Although most of the participants felt that the services would be of value and had planned to use them, they did not do so because of "lack of time."

The possible implication is that even though the participants were offered information services that could be of value to them and their colleagues, they still did not make use of them. In certain cases the services were potentially valuable because of the organizational structure of the laboratory. For example, some laboratories did not have good library facilities and this test situation should have made the participant more desirous of using the services. However, even in these cases, only a slightly greater use of the services was noted.

When the participants were asked what their reaction would be if an individual trained at the Master's level both in their field and in Library Science was made available to them for their use as they saw fit, all of them, with one exception, said that they would welcome such a service. Whether they would actually utilize such a service is a matter of speculation at the present time. However, their response was almost unanimous in preferring it to their present information-searching environment. It should be noted that the less enthusiastic responses about this approach emanated from individuals in an organization where the present library structure is apparently operated at a professional and efficient level.

Post Interview:

The post interview is planned for approximately 6 months after the original experiment. At this time the participants will again be asked to indicate their degree of use of the set of Information Services originally provided to them, because at the close of the initial portion of the study these participants were told that they might continue to use any of the Information Services provided.

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FIGURE 1

INFORMATION EVENT CARD

INFORMATION ACTIVITY EVENT CARD

Please complete both sides for each information activity event. One event per card. An information activity event is any occurrence where some piece of information reaches you that is related to your professional activities (i.e., not personal activities).

1. Location of Information Event: <input type="checkbox"/> Your Office <input type="checkbox"/> Home <input type="checkbox"/> Other: _____	2. Source of Information: <input type="checkbox"/> New source <input type="checkbox"/> Previously used source.	3. Class of Event: <input type="checkbox"/> Current Awareness <input type="checkbox"/> Specific problem <input type="checkbox"/> Exhaustive or "state of art" search
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Complete 4(a) or 4(b)

4a. Document used: <input type="checkbox"/> Journal or reprint. <input type="checkbox"/> Book or monograph <input type="checkbox"/> Gov't or private report. <input type="checkbox"/> Letter or memo. <input type="checkbox"/> Other: _____	4b. If Personal Contact: <input type="checkbox"/> Local phone call. <input type="checkbox"/> Long distance phone call. <input type="checkbox"/> Face to face (person or group). <input type="checkbox"/> Other: _____
Information Resulted From: <input type="checkbox"/> Glancing over <input type="checkbox"/> Initial Reading <input type="checkbox"/> Repeated reading (have read before). <input type="checkbox"/> Careful study	Information Event Resulted From: <input type="checkbox"/> Brief passing comment. <input type="checkbox"/> Short conversation (few minutes). <input type="checkbox"/> Extended conversation <input type="checkbox"/> Meeting of three or more persons.

(Over)

5. Information Event Stimulus:
☐ Specific or general request by you.
☐ Information provided without request by you.
☐ Other: _____

6. Value to you of Information Event (place check on scale):

_____	_____	_____	_____	_____	_____	_____	_____	_____
Negative or Misleading	Indeterminate						Positive or Very Useful	

7. Date Card Completed: _____ Time: _____

8. We are particularly interested in any unusual information event that was of particular positive or negative value to you or that had unusual circumstances connected with it. If this occurs please call 273-3388 (Chicago number). This number is a recording device and you may start immediately to describe the details of the information event. Please be sure to give the card number. Your name and organization need not be given. Talk as long as you wish. (sources used, special services, etc., would be helpful)

9. If you have any questions they may be left at the recorder number at any time. We would call you back later. Immediate response to questions may be obtained at 492-3588 or 492-3577. Ask for the "information event representative"

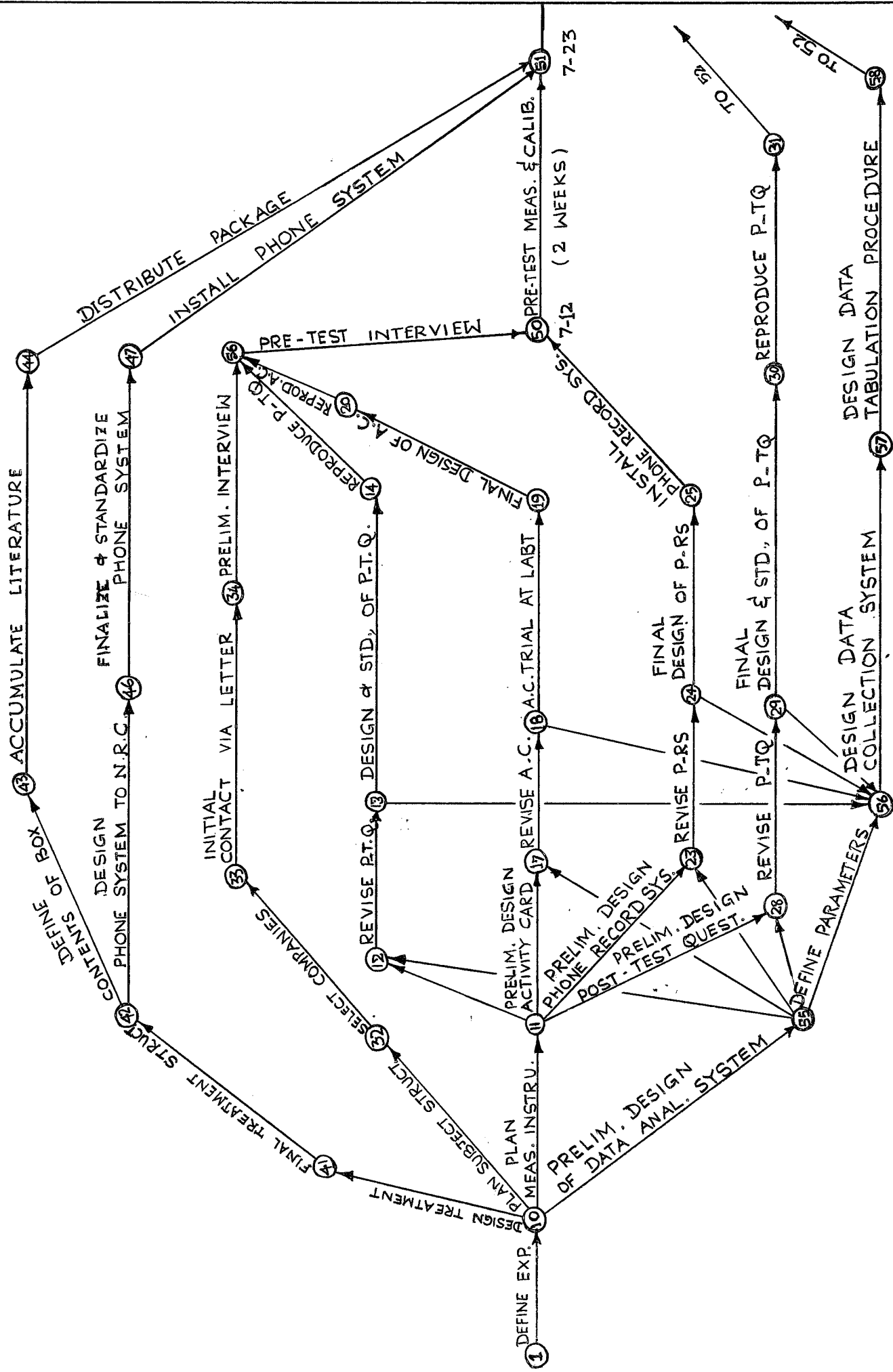
Code No. 450548

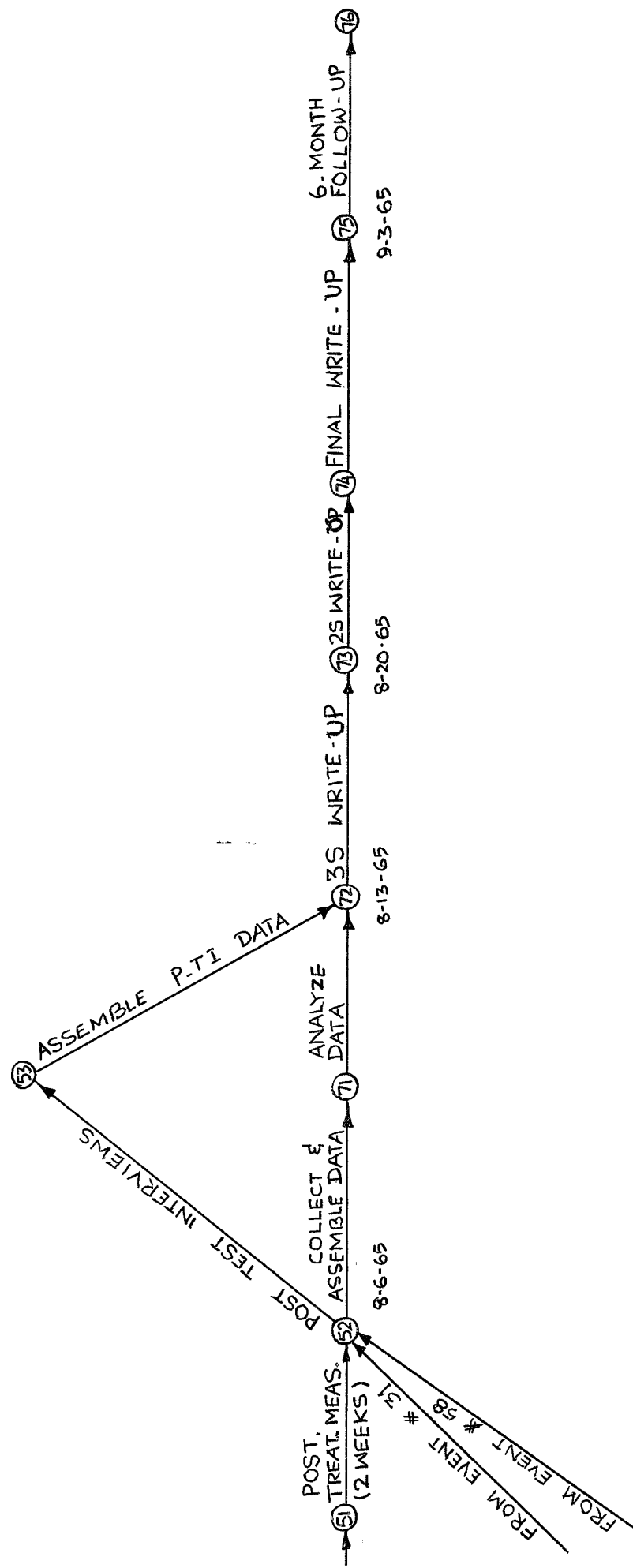
Figure 2

LIST OF INFORMATION SERVICES

1. National Referral Center
2. National Aeronautics and Space
Administration Information File Search
3. Publications of a National Research Laboratory
4. Library Acquisitions of a National Research
Laboratory
5. Current Contents
6. Reprints of Contents of Crystallography Journals
7. University Microfilms Dissertation Bibliography

FIG 3. INFO - SEARCH EXPERIMENT





APPENDIX A

PRELIMINARY WRITTEN QUESTIONNAIRE
(QUESTIONNAIRE "W")

PROGRAM OF RESEARCH ON THE MANAGEMENT
OF RESEARCH AND DEVELOPMENT

Department of Industrial Engineering and Management Sciences
The Technological Institute
Northwestern University
Evanston, Illinois

INFORMATION SEARCH EXPERIMENT

Code No. _____

QUESTIONNAIRE "W"
INFORMATION SEARCH EXPERIMENT

Identification Code No: _____

Date: _____

Please fill in or check (✓) the appropriate answers.

1. Year of Birth: _____

2. Sex: () Male
() Female

3. Highest Earned Academic Degree (if you have more than one advanced degree, use one column for each.)

Highest Degree: (1) _____ (2) _____ (3) _____

Year Granted: _____

Institution: _____

4. In addition to the duties of your present position, are you engaged in any of the following outside activities?

() Member of an advisory panel () Teaching

() Officer or member of a committee () Consulting
of a scientific society

() Editor or associate editor of () Other (please
journal specify)

5. How long have you been employed in this laboratory or department? _____

6. What is your present field of specialization? _____

7. Are there others who are interested in this specialty in this laboratory or department? Yes (), No () If yes, who else?
(Give names) _____

8. From the list below, please check those which take up most of your working time. Please indicate the 1,2,3 order for those activities taking up most of your time (use number one as most time consuming). Please estimate the approximate percentage of your working time devoted to the item you labeled as one.

Rank Three and Check Others Which Apply

- ☐ Research (individual or group)
- ☐ Research guidance (of subordinates, students)
- ☐ Management or administration of research
- ☐ Administration (other than research)
- ☐ Teaching
- ☐ Consulting
- ☐ Writing reports
- ☐ Editing
- ☐ Receiving instruction or training
- ☐ Other (please specify): _____

9. About how frequently do you have discussions with your supervisor about your work?

- ☐ One or more times a day
- ☐ A few times per week
- ☐ One a week or less often

10. Are these discussions scheduled regularly? Yes (), No ().
If No, who usually initiates them? you (), your supervisor (),
about half and half by each of you ().

We would like to know something about the facilities available for information exchange in your present position.

11. What library or libraries do you use? _____

12. Which library do you use most frequently? _____

13. (a) Please check (✓) the services available at the library that you use most frequently. (If you do not know what services are offered, please skip to the next question.)

- ☐ information and reference services _____
- ☐ interlibrary loans _____
- ☐ photo reproduction and duplicating facilities _____
- ☐ translation services _____
- ☐ bibliographic service _____
- ☐ routing of appropriate journals _____

- (b) Please place an X to the left of those services you have used.

14. Are there any services you would like to have that your library or libraries do not offer? Yes (), No (). If YES, what _____

15. Is there any unique or special service offered by any of the libraries you use that you find especially useful? Yes (), No (). If YES, what? _____
16. Is there any limitation on your professional use of the telephone? For local calls? Yes (), No (). For long distance calls? Yes (), No (). Could you specify the limitation: _____

17. About how many days did you spend away from your office on professional work during the last twelve months? _____
18. During the last twelve months did you have any temporary appointments or other institutions? Yes _____ No _____. If YES, for how long? _____
19. a. Do you have any assistants assigned to you? Yes (), No (). If YES, how many? _____. Is/are your assistant(s) supposed to route scientific material to you? Yes (), No ().
- b. Do you use this assistant for library work such as searching out some piece of information? Yes (), No ().
20. Do you ordinarily have outside paid consultants available for your work? Yes (), No (). If NO, have you ever felt it would be a good idea to call in an outsider for consultation on your research? Yes (), No (). Would this be possible in your present position? Yes _____ No _____ Have you ever done this? Yes _____ No _____
21. Does your laboratory have visiting scientists come in to give lectures or do research? Yes (), No (). (If you are in a University, this refers to your department; if you are in an Institute or an independent laboratory, this refers to the whole Institute or laboratory) If YES, is this a regular program? Yes (), No ().
22. Have you visited any other laboratories outside of your own institution or company within the last twelve months? Yes (), No (). If YES, approximately how many visits: _____.
23. What scientific or professional societies are you a member of?

24. What national society meetings did you attend within the last twelve months? (Please include meetings you attended even though you were not a member of the society or group) _____

25. Did you obtain any significant scientific information at any of these meetings? Yes (), No (). If YES, where did you learn it?
- () paper reading session
 - () symposium
 - () exhibit
 - () motion picture or TV presentation
 - () informal discussion
26. Have you given any papers or presented any addresses at symposia or the like at any meetings within the last twelve months? Yes (), No (). If YES, how many times: _____
27. Are you reluctant to discuss your own new research plans with people outside your own institution or company? Yes ____, No ____.
28. Is there any person outside your institution or company who ordinarily refers scientific information to you? Yes (), No (). If YES, approximately how many? _____

Since the scientific literature represents an important source of scientific information, we would like to find out about the specific publications you use.

29. Please check the appropriate column(s) for each journal.

Title	Have Heard of this Journal	Have Read Articles in this Journal	Regularly Review Each Issue
1. <u>Acta Crystallographica</u>	Yes (), No ()	Yes (), No ()	Yes (), No ()
2. <u>Zeitschrift Für Kristallographie</u>	Yes (), No ()	Yes (), No ()	Yes (), No ()
3. <u>Soviet Physics Crystallography</u> (Eng. Translation)	Yes (), No ()	Yes (), No ()	Yes (), No ()
4. <u>Academiai Nauk USSR. Institut Kristallografii TRUDY</u>	Yes (), No ()	Yes (), No ()	Yes (), No ()
5. <u>Progress in Crystal Physics</u>	Yes (), No ()	Yes (), No ()	Yes (), No ()
6. Others:			
(a) _____		Yes (), No ()	Yes (), No ()
(b) _____		Yes (), No ()	Yes (), No ()
(c) _____		Yes (), No ()	Yes (), No ()

30. Please list any other publications (excluding journals) significant to you that you read or scan. _____

31. Do you know of any new journals published in your field in the last twelve months? Yes (.), No (). If YES, please list their titles: _____

32. Do you use the Chemical Abstracts? Yes (), No (). If YES, about how often during the last twelve months have you used it? _____

33. Do you use any other Abstracts? Yes (), No (). If YES, please list them: _____

34. Do you use Current Contents? Yes (), No (), Never Heard of ().
If YES, about how often during the last twelve months have you
used it? _____
35. Do you use any other bibliographic services? This would include auto-
matic data processing systems as information storage and retrieval
facilities. Yes (), No (). If YES, please name them. _____

Now we would like to consider briefly a few questions about your research
activities.

36. About how many of each of the following materials have you authored or
co-authored in the past twelve months?
- | | |
|------------------------|---|
| _____ journal articles | _____ chapters in books |
| _____ books | _____ technical reports
or bulletins |
37. Are you on anyone else's mailing list who is outside your institution
or company to receive copies of any work done? Yes (), No (). If
YES, about how many persons have you requested this from?
Approximately _____ persons.
38. Are you a member of any reprint or preprint exchange group? Yes (),
No (). If YES, about how many people are involved? _____
39. Do you send copies of your work to a regular mailing list who are out-
side your institution or company? Yes (), No (). If YES, about
how many people are on this list? _____
What form are these copies in?
_____ informal (mimeographed, etc.) copies
_____ preprints
_____ reprints
_____ other (Please specify) _____
40. Have you ever completed any research and then not published it in
journal or book form? Yes (), No (). If YES, could you estimate about
how much of your research has NOT been published in book or journal
form? Most of it _____, about half of it _____, about a quarter _____,
little or none _____.
41. Think about the LAST research you completed and did not publish. Which
of the following reasons best describes why you did not:
- | | |
|-------------------------------------|--|
| _____ inconclusive results | _____ prior publication by other scientist |
| _____ loss of interest | _____ rejected by journal |
| _____ lack of time | _____ lack of financial support |
| _____ other (please specify): _____ | |

In order to get at the functioning information-exchange process from author to user, we would like to concentrate now on the last research you engaged in, for which a final report was written (internal or external use) or a manuscript prepared for publication. The questions which follow have to do only with this particular piece of research, in all of its different phases. Would you then concentrate on this research and think about the total study, from its inception to its conclusion.

42. Where did you get the idea for this research? informal discussion____, literature____, mixture of formal and informal ways____, cannot recall____.

43. Who determined this research problem? supervisor____, self with formal approval of others____, self, without formal approval of others____.

44. With whom do you discuss this research most frequently?_____

45. Was there any special information you received that influenced you during the course of the research? Yes (), No (). If YES, how did you learn of it? (Check more than one if appropriate)

- _____ attending papers at conventions
- _____ attending symposia at conventions
- _____ scanning or reading of journals
- _____ informal discussion at conventions
- _____ preprints, reprints, or abstracts from author
- _____ books or monographs
- _____ informal discussions with colleagues within employing institution
- _____ informal discussion with colleagues outside
- _____ verbal or written reports from students or assistants
- _____ TV, radio, movies
- _____ Other (Please specify)_____.

46. Did you have any problems in obtaining scientific information that you needed? Yes (), No (). If YES, could you describe what the problems were? _____

47. Did any information reach you accidentally that had a direct bearing on your research? Yes (), No (). If YES: Could you describe what the information was? (If you have already mentioned this kind of incident in one of your answers to the above questions, please indicate here merely which of the above is appropriate) _____

Now to get at the information transmission process, we would like to concentrate on how you acquainted others with the above research. Please continue to consider only this same last completed study.

48. Did you submit the research for journal publication? Yes (), No (). Was it printed as a technical report? Yes (), No (). Was it recorded and classified as security information or company confidential? Yes (), No ().
49. Have you made any oral presentations of the material? Yes (), No (). If YES, where?
- _____ a scientific society meeting
 - _____ a colloquium within your institution or company
 - _____ a colloquium outside your institution or company
 - _____ a scientific committee or group
 - _____ the contracting or granting agency
 - _____ other (Please specify) _____
50. Have you received any comments (either written or oral) on this research? Yes (), No (). If YES, what form has this taken?
- _____ written inquiries about certain phases
 - _____ requests for reprints
 - _____ discussion by colleagues
 - _____ other (Please specify) _____
51. Was there some information you now have that you would have liked to have had earlier in this research? Yes (), No (). If YES, was this information available at an earlier date? Yes (), No (). How did you find out about it? _____
-
52. Please rate each of the following items below in terms of how important it is in furnishing the scientific information you need for your scientific and professional activities. Indicate your rating by marking the scale at that point which most accurately represents the importance of each information source to your work. Also, under each major heading, space has been left for you to include any other source of information important to your work.

Importance of Information Source to
Your Work

	No Importance	Little Importance	Important	Essential to Work
A. PUBLICATIONS				
(1) Monographs published by universities or institutes				
(2) Scientific journals published in your own country				
(3) Scientific journals published in other countries.				
(4) Books published in your own country.				
(5) Books published in other countries.				
(6) Technical reports, informal mimeographed reports, etc.				
(7) Other, please describe				
B. SCIENTIFIC MEETINGS				
(1) Attendance at national scientific meetings. . . .				
(2) Attendance at international scientific meetings				
(3) Addresses at your own organization by visiting lecturers from outside your own organization.				
(4) Other, please describe				
C. PERSONAL COMMUNICATION				
(1) Discussions with colleagues within your own organization.				
(2) Discussions with colleagues working at organizations other than your own				
(3) Correspondence with colleagues.				
(4) Exchange of prepublication copies of papers. . .				
(5) Exchange of reprints or offprints.				
(6) Other, please describe				

- D. If you have inadequate contact with any of the above sources, but feel it could be important to your work, please describe your difficulty in using this source. _____
- _____
- _____

53. Are you familiar with any unpublished work closely related to your own that is being carried on at other institutions within your own country? Yes (), No (). If Yes, how did you learn of this work? _____
- _____
- _____

54. Are you familiar with any unpublished work closely related to your own that is being carried on in other countries? Yes (), No ().

55. Please list in order of importance the five or less journals which you consider most important to your scientific work.

Name of Journal	What is your access to copies?						Have you ever published in this journal?	
	Personal Subscription	Col-league's Subscription	Institutional Subscription	Other Means of Access Please Describe	Do you usually examine the contents of every issue?			
					Yes	No	Yes	No
1.								
2.								
3.								
4.								
5.								

56. Do you regularly use any index, source of reviews, or abstracting service? Yes (), No (). If Yes, please name them and check appropriate blanks to indicate their use.

Title	Used to obtain information on recent work in your field	Used to obtain information on recent work other than your major field	Used to obtain specific information such as particular data, a method, an apparatus, etc.	Used to make an exhaustive search for all information existing on a given subject	Used for the purpose of purchasing books or subscribing to journals
1.					
2.					
3.					
4.					

57. Please list the national meetings, devoted primarily to the exchange of scientific information, which you have attended within the last twelve months.

		Check to indicate approximate number of attendants					
Name of Meeting	Location of Meeting	1-25	25-50	51-100	101-200	201-500	500+
1.							
2.							
3.							
4.							
5.							

58. Do you attend local meetings of any national society? Yes (), No ().

59. In the preceding questions, we have attempted to find channels by which you receive and transmit information. Have we missed something you do in order to keep up with the latest developments in your field?

Thank You

APPENDIX A

COMMENTS ON CARD QUESTIONS

Comments follow for each question. Please note we would like you to complete the card as soon after the information event occurs as is possible. Cards are to be returned in the pre-addressed envelopes.

<u>Question Number</u>	<u>Comment</u>
1.	Please indicate the location at which the information event occurred.
2.	Is the source something or someone that you have previously used (e.g., handbook, librarian, associate, etc.) or is it a new source?
3.	Please classify this information event according to current awareness (general background information that you may not use now but might need or use later); specific point of information for which you may or may not have been looking; and an exhaustive search in a given field for state of art activities.
4(a).	Part (a) of question 4 concerns information from a document. Indicate the type of document used. Did the information result from simply glancing over the report (few seconds to a few minutes), reading the report, reading for the second or third time (have previously read), or very careful reading and study of the document?
4(b).	Part (b) of question 4 concerns information from an individual. Indicate the category of the personal contact, phone call, face to face, etc. The second part of the question is concerned with the duration of contact from brief passing comment (in the hall, a person passes your desk and tells you something, etc.) to a full meeting of three or more persons.
5.	Did you ask specifically for the information (ask librarian to locate this) or even a general request (e.g., you ask the librarian or an associate to let you know anytime he sees something on a particular subject)? The information provided without request concerns those items that come to you without your asking for them. Information from a journal to which you subscribe would be by your request.

Question Number

Comment

6. Place a check anywhere on the scale to indicate the value of the information event. Negative value results are when some source appears to be very valuable but turns out to have no value to you (e.g., you read and study a document and then find it is not appropriate or incorrectly done).
7. Please indicate the date and the time when the information event occurred.
8. Please do not hesitate to use the recorder as we find that supplementary verbal information is usually of considerable value to our study.
9. We would be pleased to answer any questions you have about the study. If left on the recording device, we would then call you back later. Direct response can be obtained from the numbers indicated on the card.

The code number is to identify the source of each card.

APPENDIX B

CLOSING WRITTEN QUESTIONNAIRE
(QUESTIONNAIRE "W")

PROGRAM OF RESEARCH ON THE MANAGEMENT
OF RESEARCH AND DEVELOPMENT

Department of Industrial Engineering and Management Sciences
The Technological Institute
Northwestern University
Evanston, Illinois

INFORMATION SEARCH EXPERIMENT

1

Code No. _____

RWT 7/1/65 M3 PV

QUESTIONNAIRE "W" M3PV
INFORMATION SEARCH EXPERIMENT

Identification Code No: _____

Date: _____

Please fill in or check (✓) the appropriate answers.

1. What library or libraries do you use? _____

2. (a) Please check (✓) the services available at the library that you use most frequently. (If you do not know what services are offered, please skip to the next question.)

() information and reference services _____

() interlibrary loans _____

() photo reproduction and duplicating facilities _____

() translation services _____

() bibliographic service _____

() routing of appropriate journals _____

(b) Please place an X to the left of those services you have used.

3. Are there any services you would like to have that your library or libraries do not offer? Yes (), No (). If YES, what _____

4. Is there any unique or special service offered by any of the libraries you use that you find especially useful? Yes (), No (). If YES, what? _____

5. About how many days did you spend away from your office on professional work during the last four weeks? _____

6. During the last twelve months did you have any temporary appointments at other institutions? Yes ____ No ____ If YES, for how long? _____

7. a Do you have any assistants assigned to you? Yes (), No (). If YES, how many? _____. Is/are your assistant(s) supposed to route scientific material to you? Yes (), No ().

b Do you use this assistant for library work such as searching out some piece of information? Yes (), No ().

8. Please check the appropriate column(s) for each journal.

Title	Have Heard of this Journal	Have Read Articles in this Journal	Regularly Review Each Issue
1. <u>Acta Crystallog-</u> <u>raphica</u>	Yes (), No ()	Yes (), No ()	Yes (), No ()
2. <u>Zeitschrift für</u> <u>Kristallographie</u>	Yes (), No ()	Yes (), No ()	Yes (), No ()
3. <u>Soviet Physics</u> <u>Crystallography</u> (Eng. Translation)	Yes (), No ()	Yes (), No ()	Yes (), No ()
4. Academia Nauk USSR. Institut Kristallografii <u>TRUDY</u>	Yes (), No ()	Yes (), No ()	Yes (), No ()

9. Do you use the Chemical Abstracts? Yes (), No ().

10. Do you use Current Contents? Yes (), No (), Never Heard Of (). If Yes, about how often during the last four weeks have you used it? _____

11. During the past four weeks did you have any problems in obtaining scientific information that you needed? Yes (), No (). If Yes, could you describe what the problems were? _____

12. Did any information reach you accidentally that had a direct bearing on your research? Yes (), No (). If Yes: Could you describe what the information was? _____

13. Was there some information you now have that you would have liked to have had earlier in your research? Yes (), No (). If Yes, was this information available at an earlier date? Yes (), No (). How did you find out about it? _____

14. Please rate each of the following items on the next page in terms of how important it is in furnishing the scientific information you need for your scientific and professional activities. Indicate your rating by marking the scale at that point which most accurately represents the importance of each information source to your work. Also, under each major heading space has been left for you to include any other source of information important to your work.

Importance of Information Source to Your Work

	No Importance	Little Importance	Important	Essential to Work
A. PUBLICATIONS				
(1) Monographs published by universities or institutes.				
(2) Scientific journals published in your own country.				
(3) Scientific journals published in other countries.				
(4) Books published in your own country. . .				
(5) Books published in other countries. . . .				
(6) Technical reports, informal mimeographed reports, etc.				
(7) Other, please describe				
(8) Thesis				
B. SCIENTIFIC MEETINGS				
(1) Attendance at national scientific meetings.				
(2) Attendance at international scientific meetings.				
(3) Addresses at your own organization by visiting lecturers from outside your own organization.				
(4) Other, please describe				
C. PERSONAL COMMUNICATION				
(1) Discussions with colleagues within your own organization. . . .				
(2) Discussions with colleagues working at organizations other than your own.				
(3) Correspondence with colleagues.				
(4) Exchange of pre-publication copies of papers.				
(5) Exchange of reprints or offprints.				
(6) Other, please describe				

- D. If you have inadequate contact with any of the above sources, but feel it could be important to your work, please describe your difficulty in using this source. _____

APPENDIX C

CLOSING INTERVIEW
(QUESTIONNAIRE V)

PROGRAM OF RESEARCH ON THE MANAGEMENT
OF RESEARCH AND DEVELOPMENT

Department of Industrial Engineering and Management Sciences
The Technological Institute
Northwestern University
Evanston, Illinois

INFORMATION SEARCH EXPERIMENT

Code No. _____

Instructions to Interviewers (1)

Read the questions to the S and tape record all replies to questions.

You should also make notes in the spaces below each question.

INTRODUCTORY REMARKS

In this interview we would like to tape record your answers as an aid in note-taking. It is impossible to record in longhand all that is said and because of the importance of the answers to the study we don't want to miss anything.

Please be as frank as you can in replying to the questions and be assured that all replies will remain confidential insofar as identifying the individual or the organization.

- [illegible]

3. We would like now to get some data about the information services supplied to half of the participants in this study.

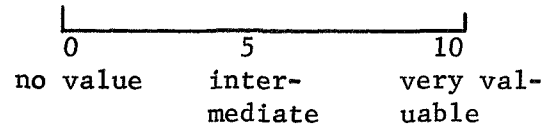
Please check off the answers on this sheet _____ (Form A)

Please check off the answers on this sheet _____ (Form B)

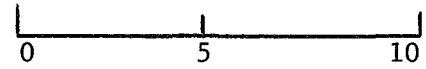
Please check off the answers on this sheet _____ (Form C, p. 7)

4. Please list below any other information services that you know of or would like to have. Please rate according to their value to you.

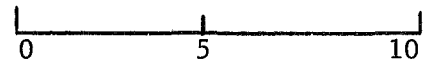
1.



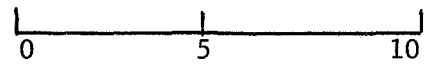
2.



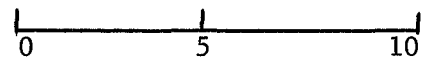
3.



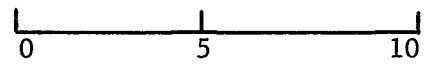
4.



5.



6.



5. Here is a list of the information services made available to half of the participants in this study. Each service was enclosed in a folder, with a cover sheet describing the contents. For those that you looked at, please comment on your reactions, i.e.;

when did you open them?

where did you open them?

what did you think about them?

which ones are still unopened?

what was the sequence in opening?

did you look at them again after the appointment was made for this interview?

6. What would be your reaction if the services of a person trained at the master's level in your field and in library science were made available to you? You would be permitted to use this person's time as much or as little as you wished.

Would you prefer this to the set of information services provided in this study?

7. Did anything unusual happen in your organization during the study that might effect the collection of data or your reaction to the study, e.g., a new project, change in organizational structure, etc.?

8. It is possible because of work activity, interruptions, etc., that you prepared information event cards for only a portion of the information events? Could you estimate the percentage of the total number that probably occurred for which you have prepared cards?

9. Do you have any comments that you would like to make about the study?

APPENDIX D
PROCEDURAL DETAILS FOR INFORMATION
SEARCHING STUDY

PROGRAM OF RESEARCH ON THE MANAGEMENT
OF RESEARCH AND DEVELOPMENT

Department of Industrial Engineering and Management Sciences
The Technological Institute
Northwestern University
Evanston, Illinois

PROCEDURAL DETAILS FOR INFORMATION SEARCHING STUDY

The purpose of this research is to describe the information-searching activities of the subjects and to note the effect of a transient of information services on the subject's information searching behavior.

The basic data collection device is a small 3"x5" card containing questions of the check off variety that relate to the information-searching behavior of the subject. In addition, a telephone recording device at Northwestern University permits the subject to phone in additional data when appropriate. (details are given below.)

Information Activity Event Card

The information recorded on the card concerns what is called an information activity event, or information event, for short. The information event is an occurrence in time where some piece of information reaches the subject and where the piece of information is related to his professional activities. The piece of information may simply be saved as current awareness or background material or it may constitute a specific point of value usable in the subject's current activities. It might also be of no value or even negative value.

Negative value might occur when the subject goes to the trouble of reading some document or report that appears to be valuable but finds it to be worthless to him.

The card itself has been designed to be self-explanatory but the following information is provided as background. A single card is to be used for the recording of a single information event and, therefore, only

one check should be marked for any one question with the exception of 4a. or 4b., either of which requires two checks. Please note that the "other" category (questions 1, 4, and 5) has a place for you to write in briefly a description of the answer if not specified on the card. Appendix A (attached to these sheets) provides a detailed description of card use.

The cards should be completed as soon after the information event as is possible, and then mailed each day using the stamped, self-addressed envelope provided with the cards. The cards have been designed to be carried in your shirt pocket or lab jacket pocket.

Typical examples of information events are the following:

1. The subject desires a given constant or piece of data and looks it up in a handbook.
2. The subject remembers the results of a given experiment and goes back to a reprint or journal article.
3. An associate provides information to the subject either solicited or unsolicited that is of value (or possibly not of value).
4. The subject requests a third party such as a librarian or assistant to obtain certain information either through a search or a review of literature in the field.
5. A new service is made available to the subject and he uses the service to obtain information relative to his professional activities.
6. An associate advises him in passing in the hall about a new result or activity or interest.

Telephone Recording Data Collection Technique

As an aid to easy reporting of additional information, a telephone recording device has been installed at Northwestern University. You simply dial the telephone number found on the information event card and start talking after the first beep tone is heard. These tones are repeated periodically but you may talk as long as you wish.

We urge you to take advantage of the tape recorder technique to report additional details about your information searching activities. It is highly desirable that we gather additional background information about your activities with respect to information searching. You give only your code number from the data card. It is not necessary to identify yourself or the company, but you must give the card number. We do suggest, however, that you do not discuss on the telephone any items of a proprietary or company confidential nature. We are interested more in your techniques of information searching rather than the specific details of the data required.

In using the recorder it is not necessary to provide a formalized structural description of the event, but instead merely comment informally on some of the problems or some of the favorable occurrences you have had associated with obtaining the piece of information. Special techniques that you yourself use or unusual sources should be described. The recording device equipment is designed to accept relatively long messages and multiple telephone lines are available. One telephone number only is required to input into any of the recording devices.

Should you have any questions concerning the study, they may be asked at the time of the recording and we will call you back. Another method is

to call 492-3588 or 492-3577 (Evanston numbers) asking for the "information searching representative" and questions may be discussed immediately.

Please note that complete anonymity will be maintained for all participants.

Thank you for your cooperation.

APPENDIX E
INFORMATION SERVICES INSTRUCTION SHEETS
AND ORDER FORMS

INFORMATION SERVICES PACKAGE

Enclosed is a set of Information Services, each contained in a folder with a cover sheet describing the contents. We ask you to read the cover sheet before opening any of the folders. We are not requesting that you read this material. It is provided to you as an unsolicited gift of information services. It is your decision whether or not you will even read the material provided. We do ask that you continue to provide us with the data records (Information Event cards and phone calls) as previously established.

It should be noted that the Information Event cards would also apply to the new Information Services provided to you.

Thank you.

DO NOT OPEN THIS FOLDER UNTIL YOU HAVE READ THE FOLLOWING.

INFORMATION SERVICE NUMBER ONE

NATIONAL REFERRAL SERVICE

Enclosed in this folder is a brochure describing the NATIONAL REFERRAL CENTER FOR SCIENCE AND TECHNOLOGY located at the Library of Congress in Washington, D. C. It is operated by the Library of Congress with support from NSF (National Science Foundation) and is designed to provide a single place to which scientists and engineers may turn for advice on where and how to obtain scientific or technical knowledge of any kind.

As part of this research study in which you are participating, we are making available to you three long distance telephone calls (no charge to you) to the National Referral Center for any purpose that you desire related to your professional activities. Instructions for placing these calls are enclosed in the folder.

As part of the research data collection, we ask that you not break the seal on this folder unless you are interested in finding out more about the service enclosed. It is not necessary that you use the service after you have opened the folder. Basically, you may open the folder to obtain more information about the service, and then you may or may not decide to use the service.

INFORMATION SERVICE RESEARCH STUDY

INFORMATION SERVICE NUMBER ONE

The following procedure must be used to call the National Referral Center:

1. Call the Long Distance Operator (211)
2. Say "I would like to place a long distance call and have it billed to the following number; 869-3441. The number I wish to call is (area code + number) (see information pamphlet). My phone number is _____."

DO NOT OPEN THIS FOLDER UNTIL YOU HAVE READ THE FOLLOWING.

INFORMATION SERVICE NUMBER TWO

NASA (National Aeronautics and Space Administration) FILE SEARCH

Enclosed in this folder are copies of some pages from the output of a computer search of the NASA tape files. These files include bibliographic entries for all publications and reports listed in Scientific and Technical Aerospace Reports (STAR), and the International Aerospace Abstracts (IAA). Also enclosed is a recent copy of STAR, the semi-monthly abstract journal.

The sample copies are taken from a search of all information pertaining to "X-Ray." This particular search (intentionally general) yielded approximately 600 references all related to X-Ray, with some related to X-Ray crystallography.

Also enclosed in this folder is a form listing terms that you are to use to describe your interests within the field. A special search would then be run, and the output would provide bibliographic entries for those reports containing material on X-Ray and the other descriptive terms that you select. It will take approximately one week for you to receive the computer print-out from your search. It is also necessary for you to complete any forms that may be enclosed in this folder in order to obtain the service.

As part of the research data collection, we ask that you not break the seal on this folder unless you are interested in finding out more about the service enclosed. It is not necessary that you use the service after you have opened the folder. Basically, you may open the folder to obtain more information about the service, and then you may or may not decide to use the service.

INFORMATION SERVICE NUMBER TWO

NASA FILE SEARCH REQUEST FORM

Please check the appropriate descriptive terms listed below for use in providing you with a computer search of the NASA tape files. These files contain bibliographic entries taken from Scientific and Technical Aerospace Reports and International Aerospace Abstracts.

- _____ 1 X-Ray Analysis
- _____ 2 X-Ray Diffraction
- _____ 3 X-Ray Florescence Spectroscopy
- _____ 4 X-Ray Irradiation
- _____ 5 X-Ray Photography
- _____ 6 X-Ray Spectroscopy
- _____ 7 X-Ray Crystallography

Your Name: _____ Telephone Number: _____

Company: _____

Mailing Address: _____

Date Requested: _____

RETURN THIS FORM TO NORTHWESTERN UNIVERSITY, USING THE ENCLOSED
PREADDRESSED ENVELOPE.

DO NOT OPEN THIS FOLDER UNTIL YOU HAVE READ THE FOLLOWING.

INFORMATION SERVICE NUMBER THREE

LIBRARY PUBLICATIONS OF A NATIONAL RESEARCH LABORATORY

Enclosed in this folder are two publications:

- (1) Publications of a National Research Laboratory (July 1, 1963 - June 30, 1965)
- (2) Technical Publications of a National Research Laboratory (March, 1965)

These documents indicate the publications of the Argonne National Laboratory and are indexed by subject, author, and number within broad subject divisions. These reports may be ordered through the research study in which you are participating by completing the order form enclosed in the folder. It is necessary, however, to copy the entire bibliographic entry in order to receive the report. The bibliographic entry will be found under the subject divisions in the front portion of the documents.

As part of the research data collection, we ask that you not break the seal on this folder unless you are interested in finding out more about the service enclosed. It is not necessary that you use the service after you have opened the folder. Basically, you may open the folder to obtain more information about the service, and then you may or may not decide to use the service.

INFORMATION SERVICE NUMBER THREE ORDER FORM

Information Service Title: Publications of a National Research Laboratory

1. Bibliographic entry of publication desired:

2. Have you ever seen either of the enclosed documents? Yes (), No ()

3. Have you ever used either of the enclosed documents? Yes (), No ()

4. Would you make use of this service in the future if it were made
available to you? Yes (), No ()

5. Is this service available in your organization's library?

Yes (), No (), Do not know ().

Name: _____

Address: _____

Date: _____

DO NOT OPEN THIS FOLDER UNTIL YOU HAVE READ THE FOLLOWING.

INFORMATION SERVICE NUMBER FOUR

LIBRARY LISTINGS OF A NATIONAL RESEARCH LABORATORY

Enclosed in this folder is a copy of a recent document published by the Library Service Department of a National Research Laboratory Library, listing new additions to the library. It is broken down by broad subject categories.

Copies of reports in this document may be made available to you. A request form is enclosed for your use. Please note that the entire bibliographic entry must be copied on the request form.

As part of the research data collection, we ask that you not break the seal on this folder unless you are interested in finding out more about the service enclosed. It is not necessary that you use the service after you have opened the folder. Basically, you may open the folder to obtain more information about the service, and then you may or may not decide to use the service.

INFORMATION SERVICE NUMBER FOUR ORDER FORM

Information Service Title: Additions To The Library of a National Research
Laboratory

1. Bibliographic entry of publication desired:

2. Have you ever seen either of the enclosed documents? Yes (), No ()

3. Have you ever used either of the enclosed documents? Yes (), No ()

4. Would you make use of this service in the future if it were made
available to you? Yes (), No ()

5. Is this service available in your organization's library?

Yes (), No (), Do not know ().

Name: _____

Address: _____

Date: _____

DO NOT OPEN THIS FOLDER UNTIL YOU HAVE READ THE FOLLOWING.

INFORMATION SERVICE NUMBER FIVE

CURRENT CONTENTS

Enclosed in this folder is one copy of each of the recent issues of Current Contents in both the physical and life sciences and for Index Chemicus.

These publications provide copies of the Table of Contents from journals in the field represented. The purpose of the publication is to advise the reader about publications in his and related fields. The reader could then request copies of the journal article through his library or directly through the organization that publishes the Current Contents.*

As part of the research study in which you are now participating, two articles will be made available to you upon completion of the order forms enclosed in this folder. It is necessary for you to copy the entire title of the publication and the article as well as the authors.

As part of the research data collection, we ask that you not break the seal on this folder unless you are interested in finding out more about the service enclosed. It is not necessary that you use the service after you have opened the folder. Basically, you may open the folder to obtain more information about the service, and then you may or may not decide to use the service.

*

Note that this publication is issued weekly and as such the issue you have received covers only about one fifth of the journals included in the Current Contents service.

INFORMATION SERVICE NUMBER FIVE ORDER FORM

Information Service Title: Current Contents

1. Bibliographic entry of publication desired:

2. Have you ever seen either of the enclosed documents? Yes (), No ()

3. Have you ever used either of the enclosed documents? Yes (), No ()

4. Would you make use of this service in the future if it were made
available to you? Yes (), No ()

5. Is this service available in your organization's library?

Yes (), No (), Do not know ().

Name: _____

Address: _____

Date: _____

DO NOT OPEN THIS FOLDER UNTIL YOU HAVE READ THE FOLLOWING.

INFORMATION SERVICE NUMBER SIX

CRYSTALLOGRAPHY JOURNALS

Enclosed in this folder are xerox copies of the Table of Contents from four crystallography journals. They are presented to you in order that we may determine if they contain material related to your professional activities. We would also like to know if you have used these journals previously as a source of information.

Copies of any of the articles in these journals may be made available to you upon request. An order form is enclosed for your convenience. Please note that the entire bibliographic information must be enclosed, including the journal title, date, volume number, article title, authors, etc.

As part of the research data collection, we ask that you not break the seal on this folder unless you are interested in finding out more about the service enclosed. It is not necessary that you use the service after you have opened the folder. Basically, you may open the folder to obtain more information about the service, and then you may or may not decide to use the service.

INFORMATION SERVICE NUMBER SIX ORDER FORMS

Information Service Title: Crystallography Journals

1. Bibliographic entry of publication desired:

2. Have you ever seen either of the enclosed documents? Yes (), No ()

3. Have you ever used either of the enclosed documents? Yes (), No ()

4. Would you make use of this service in the future if it were made
available to you? Yes (), No ()

5. Is this service available in your organization's library?

Yes (), No (), Do not know ().

Name: _____

Address: _____

Date: _____

DO NOT OPEN THIS FOLDER UNTIL YOU HAVE READ THE FOLLOWING.

INFORMATION SERVICE NUMBER SEVEN

UNIVERSITY MICROFILMS INC.

Enclosed in this folder is a bibliography of dissertations on crystallography taken from Volumes XXIV and XXV of Dissertation's Abstracts.

An order form is also enclosed to order one dissertation in microfilm or hard copy.

As part of the research data collection, we ask that you not break the seal on this folder unless you are interested in finding out more about the service enclosed. It is not necessary that you use the service after you have opened the folder. Basically, you may open the folder to obtain more information about the service, and then you may or may not decide to use the service.

INFORMATION SERVICE NUMBER SEVEN ORDER FORM

Information Service Title: University Microfilms

1. Bibliographic entry of publication desired:

2. Have you ever seen either of the enclosed documents? Yes (), No ()
3. Have you ever used either of the enclosed documents? Yes (), No ()
4. Would you make use of this service in the future if it were made
available to you? Yes (), No ()
5. Is this service available in your organization's library?
Yes (), No (), Do not know ().

Name: _____

Address: _____

Date: _____

APPENDIX F
"MODAL" SUBJECT DATA

This data represents a "modal" or typical set of answers from the written questionnaires.

1. Age 39
2. Male
3. Ph.D. for Non-Industrials, MS for Industrials
4. Engaged in none or 1 outside activity
5. Been with company about 8 years
6. Field of specialization is X-Ray Crystallography or X-Ray Diffraction
8. Primary activity is doing research
9. Meets with supervisor infrequently (once a week or less)
10. These meetings are not scheduled regularly. They are initiated both by the worker and by the supervisor about half the time.
13. Library offers four services of the six mentioned. They are:
 - information and reference services
 - interlibrary loans
 - photo reproduction and duplicating facilities
 - translation servicesWorker has used three of the six. They are:
 - information and reference services
 - interlibrary loans
 - photo reproduction and duplicating facilities
14. No service requested that is not offered by library
15. No unique services offered by library
16. There are no limitations on subjects' use of the phone
17. Has been away about 12 days
18. No temp. appointments
19. Has 2 assistants; they do not route material for the subject
21. Departments have visiting lecturers regularly
22. Has made 2 visits to other labs in the past year
23. Is a member of three professional societies:
 - ACS
 - ACA
 - ASM
25. Did obtain significant information at meetings in the form of:
 - paper-reading sessions, exhibits, informal discussions

26. Industrial worker has not presented any papers. Non-Industrial worker has presented 2.
27. Non-Industrial not reluctant to discuss research;
Industrial reluctant
28. Non-Industrial worker regularly reviews 2 journals:
Acta Crystallographica, Zeitschrifte für Kristallographie
Has read articles in 1 other:
Academia Nauk USSR, Institut Kristallografii
TRUDY
Has heard of 2 others:
Soviet Physics Crystallography, Progress in Crystal Physics
- Industrial worker:
regularly reviews none
has read articles in 1:
Acta Crystallographica
has heard of others:
Zeitschrifte für Kristallographie
30. Reads or scans two other journals:
Nuclear Science Abstracts, Scientific American
31. No new journals
32. Has used Chemical Abstracts 5-10 times in the past year
34. Has never heard of Current Contents
35. No other bibliographic service used
36. Non-Industrial: Has authored or co-authored:
3 journal articles
0 chapters in books
0 books
3 technical reprints or bulletins
- Industrial: has authored or co-authored:
0 journal articles
0 chapters in books
0 books
20 technical reports or bulletins
37. Non-Industrial: Is on mailing list, receives material from 3 persons
Industrial: Not on mailing list
38. No, not a member of any preprint exchange group
39. Do not send copies of work to regular mailing list
40. Has completed research and then not published it, but most work has been published for non-industrial subject; little or none has been published for the industrial subject.

41. The reason for not publishing has been prior publication by other scientist for non-industrial; confidential material for the industrial subject.
42. Idea for research came from mixture of formal and informal ways
43. Research problem was determined by the scientist for non-industrial subjects; determined by supervisor for industrial subjects
45. Two sources of special information important:
 - (1) Scanning or reading journals
 - (2) Informal discussions with colleagues
46. No problems in obtaining information needed
47. No information gained accidentally that had a direct bearing on research
48. Non-Industrial:
 - Submitted for publication
 - Printed as a technical report
 - Not classified
Industrial:
 - Not submitted for publication
 - Printed as a technical report
 - Classified
49. Has made 1 oral presentation:
 - Scientific Society meeting for non-industrial
 - A colloquium within institution for industrial
50. Has received comments from two sources:
 - 1) requests for reprints
 - 2) discussion by colleagues
51. No information desired earlier in the research

52. Importance to subject of information sources:

	No Importance	Little Importance	Important	Essential
Monographs			✓	
Journals in U.S.				✓
Foreign Journals			✓	
U.S. Books			✓	
Foreign Books			✓	
Technical Reports			✓	
Ph.D. Theses				
National Meetings			✓	
International Meetings		✓		
Visiting Lecturers			✓	
Discussion with colleagues within organization				✓
Discussion with other colleagues			✓	
Correspondence with colleagues			✓	
Exchange of Preprints		✓		
Exchange of Reports			✓	

53. Is familiar with unpublished work in this country in the field, if non-industrial; is not, if industrial.

Non-Industrial subjects familiar through discussion

54. Non-Industrial familiar with foreign work
Industrial not

55. Believes five most important journals are:

1. Acta Crystallographica
2. Annals of Chemistry
3. Journal of the American Ceramic Society
4. Journal of Physical Chemistry
5. Trans. AIME

Usually examines contents of first two if non-industrial; first four, if industrial. Non-Industrial subjects have published in two of the five; industrial in none of them. First two on list are subscribed to by subjects; others are available through company subscriptions.

56. Industrial subjects do not use index source of reviews; Non-Industrial do: Nuclear Science Abstracts, used to obtain information on recent work in field and to obtain information on recent work in other fields.

APPENDIX G
INFORMATION EVENT CHARACTERISTICS (PRE/POST)
(Frequency Count Data)

	<u>Non-Industrial</u>		<u>Industrial</u>	
	Control Pre/Post	Test Pre/Post	Control Pre/Post	Test Pre/Post
1. Location of Information Event				
A. Your office	68/24	65/39	204/162	178/131
B. Home	19/7	3/0	5/2	6/5
C. Other	24/9	13/6	49/11	20/35
D. Unclassified	0/0	0/0	2/0	0/3
2. Source of Information				
A. New Source	66/13	28/20	83/34	38/37
B. Previously Used Source	44/27	52/25	176/141	164/134
C. Unclassified	1/0	1/0	1/0	2/3
3. Class of Event				
A. Current Awareness	35/9	18/15	103/50	73/54
B. Specific Problem	75/28	51/28	154/106	126/100
C. Exhaustive Search	0/3	10/1	2/19	2/17
D. Unclassified	1/0	2/1	1/0	3/3
4. Document Used				
A. Journal or Reprint	52/14	15/18	36/37	35/38
B. Book or Monograph	17/5	31/18	32/11	21/11
C. Govt. or Private Report	6/3	6/1	18/18	3/8
D. Letter or Memo	7/3	4/0	21/8	11/7
E. Other	0/1	2/1	20/6	18/11
F. Unclassified	0/0	0/0	0/0	0/3
5. Information resulted From				
A. Glancing Over	28/7	15/14	43/26	36/35
B. Initial Reading	20/6	18/14	41/21	22/29
C. Repeated Reading	19/1	16/9	21/14	26/10
D. Careful Study	15/10	8/1	22/19	4/1
E. Unclassified	0/2	1/0	0/0	0/3
6. Personal Contact				
A. Local Phone Call	1/8	6/2	7/9	14/5
B. Long Distance Call	1/0	2/0	6/9	3/10
C. Face to Face	27/6	14/5	88/77	96/80
D. Other	0/0	1/0	32/0	2/1
E. Unclassified	0/0	0/0	0/0	0/3
7. Information Event Resulted From				
A. Brief Passing Comment	0/1	1/0	3/2	6/0
B. Short Conversation	14/7	7/3	49/43	66/43
C. Extended Conversation	9/5	5/2	40/37	31/41
D. Meeting of Three or More	6/1	6/2	41/13	12/12
E. Unclassified	0/0	3/0	0/0	1/3
8. Information Event Stimulus				
A. Information Requested By You	74/30	48/34	160/109	117/106
B. Provided Without Your Request	36/8	22/9	81/62	76/63
C. Other	0/1	6/0	1/1	4/0
D. Unclassified	1/1	5/2	17/3	7/5
Total Events Reported	111/40	81/45	260/175	204/174

INFORMATION EVENT CHARACTERISTICS
(Probability Data)

	<u>Non-Industrial</u>		<u>Industrial</u>	
	Control Pre/Post	Test Pre/Post	Control Pre/Post	Test Pre/Post
1. Location of Information Event				
A. Your Office	.612/.600	.802/.866	.784/.925	.872/.752
B. Home	.171/.175	.037/.0	.019/.011	.029/.028
C. Other	.216/.225	.160/.133	.188/.062	.098/.201
D. Unclassified	.0/.0	.0/.0	.007/.0	.0/.017
2. Source of Information				
A. New Source	.594/.325	.345/.444	.319/.194	.186/.212
B. Previously Used Source	.396/.675	.641/.555	.676/.805	.803/.770
C. Unclassified	.009/.0	.012/.0	.003/.0	.009/.017
3. Class of Event				
A. Current Awareness	.315/.225	.222/.333	.396/.285	.357/.310
B. Specific Problem	.675/.700	.629/.622	.592/.605	.617/.574
C. Exhaustive Search	.0/.075	.123/.022	.007/.108	.009/.097
D. Unclassified	.009/.0	.024/.022	.003/.0	.014/.017
4. Document Used				
A. Journal or Reprint	.634/.538	.258/.473	.283/.462	.397/.487
B. Book or Monograph	.207/.192	.534/.473	.251/.137	.238/.141
C. Govt. or Private Report	.073/.115	.103/.026	.141/.225	.034/.102
D. Letter or Memo	.085/.115	.068/.0	.165/.100	.125/.089
E. Other	.0/.038	.034/.026	.157/.075	.204/.141
F. Unclassified	.0/.0	.0/.0	.0/.0	.0/.038
5. Information Resulted From				
A. Glancing Over	.341/.269	.258/.368	.338/.325	.409/.448
B. Initial Reading	.243/.230	.310/.368	.322/.262	.250/.371
C. Repeated Reading	.231/.038	.275/.236	.165/.175	.295/.128
D. Careful Study	.182/.384	.137/.026	.173/.237	.045/.012
E. Unclassified	.0/.076	.017/.0	.0/.0	.0/.038
6. Personal Contact				
A. Local Phone Call	.034/.571	.260/.285	.052/.094	.120/.052
B. Long Distance Phone Call	.034/.0	.086/.0	.045/.094	.025/.104
C. Face to Face	.931/.428	.608/.714	.661/.810	.827/.833
D. Other	.0/.0	.043/.0	.240/.0	.017/.010
E. Unclassified	.0/.0	.0/.0	.0/.0	.0/.031
7. Information Event Resulted From				
A. Brief Passing Comment	.0/.071	.043/.0	.022/.021	.051/.0
B. Short Conversation	.482/.500	.304/.428	.368/.452	.568/.447
C. Extended Conversation	.310/.357	.217/.285	.300/.389	.267/.427
D. Meeting of Three or More	.206/.071	.260/.285	.308/.136	.103/.125
E. Unclassified	.0/.0	.130/.0	.0/.0	.008/.031
8. Information Event Stimulus				
A. Information Requested By You	.666/.750	.592/.755	.615/.622	.573/.609
B. Provided Without Your Request	.324/.200	.271/.200	.311/.354	.372/.362
C. Other	.0/.025	.074/.0	.003/.005	.019/.0
D. Unclassified	.009/.025	.061/.044	.065/.017	.034/.028

INFORMATION EVENT CATEGORIES (Probability data)
(Documents and Personal Contact)

		<u>Non-Industrial</u>		<u>Industrial</u>	
		Control	Test	Control	Test
		Pre/Post	Pre/Post	Pre/Post	Pre/Post
I.	DOCUMENT USED				
A.	Journal or Reprint	.468/.350	.185/.400	.138/.211	.171/.218
B.	Book or Monograph	.153/.125	.382/.400	.123/.062	.102/.063
C.	Govt. or Private Report	.054/.075	.074/.022	.069/.102	.014/.045
D.	Letter or Memo	.063/.075	.049/.0	.080/.045	.053/.040
E.	Other	.0/.025	.024/.022	.076/.034	.088/.063
F.	Unclassified	.0/.0	.0/.0	.0/.0	.0/.017
II.	PERSONAL CONTACT				
A.	Local Phone Call	.009/.200	.074/.044	.026/.051	.068/.028
B.	Long Distant Phone Call	.009/.0	.024/.0	.023/.051	.014/.057
C.	Face to Face	.243/.150	.172/.111	.338/.440	.470/.459
D.	Other	.0/.0	.012/.0	.123/.0	.009/.005
E.	Unclassified	.0/.0	.0/.0	.0/.0	.0/.017

APPENDIX H
 INFORMATION EVENT CHARACTERISTICS (Frequency)
 (Non-Industrial vs. Industrial)

	EXPERIMENTAL SUBJECTS		CONTROL SUBJECTS	
	PRE TREAT.	POST TREAT.	PRE TREAT.	POST TREAT.
	NI/I	NI/I	NI/I	NI/I
1. Location of Information Event				
A. Your Office	65/178	39/131	68/204	24/162
B. Home	3/6	0/5	19/5	7/2
C. Other	13/20	6/35	24/49	9/11
D. Unclassified	0/0	0/3	0/2	0/0
2. Source of Information				
A. New Source	28/38	20/37	66/83	13/34
B. Previously Used Source	52/164	25/134	44/176	27/141
C. Unclassified	1/2	0/3	1/1	0/0
3. Class of Event				
A. Current Awareness	18/73	15/54	35/103	9/50
B. Specific Problem	51/126	28/100	75/154	28/106
C. Exhaustive Search	10/2	1/17	0/2	3/19
D. Unclassified	2/3	1/3	1/1	0/0
4. Document Used				
A. Journal or Reprint	15/35	18/38	52/36	14/37
B. Book or Monograph	31/21	18/11	17/32	5/11
C. Govt. or Private Report	6/3	1/8	6/18	3/18
D. Letter or Memo	4/11	0/7	7/21	3/8
E. Other	2/18	1/11	0/20	1/6
F. Unclassified	0/0	0/3	0/0	0/0
5. Information Resulted From				
A. Glancing Over	15/36	14/35	28/43	7/26
B. Initial Reading	18/22	14/29	20/41	6/21
C. Repeated Reading	16/26	9/10	19/21	1/14
D. Careful Study	8/4	1/1	15/22	10/19
E. Unclassified	1/0	0/3	0/0	2/0
6. Personal Contact				
A. Local Phone Call	6/14	2/5	1/7	8/9
B. Long Distance Phone Call	2/3	0/10	1/6	0/9
C. Face to Face	14/96	5/80	27/88	6/77
D. Other	1/2	0/1	0/32	0/0
E. Unclassified	0/0	0/3	0/0	0/0
7. Information Event Resulted From				
A. Brief Passing Comment	1/6	0/0	0/3	1/2
B. Short Conversation	7/66	3/43	14/49	7/43
C. Extended Conversation	5/31	2/41	9/40	5/37
D. Meeting of Three or More	6/12	2/12	6/41	1/13
E. Unclassified	3/1	0/3	0/0	0/0
8. Information Event Stimulus				
A. Information Requested By You	48/117	34/106	74/160	30/109
B. Provided Without Your Request	22/76	9/63	36/81	8/62
C. Other	6/4	0/0	0/1	1/1
D. Unclassified	5/7	2/5	1/17	1/3
Total Events Reported	81/204	45/174	111/260	40/175

INFORMATION EVENT CHARACTERISTICS (Probability)
(Non-Industrial vs. Industrial)

	EXPERIMENTAL PRE TREAT. NI/I	SUBJECTS POST TREAT. NI/I	CONTROL PRE TREAT. NI/I	SUBJECTS POST TREAT. NI/I
1. Location of Information Event				
A. Your Office	.802/.872	.866/.752	.612/.784	.600/.925
B. Home	.037/.029	.0/.028	.171/.019	.175/.011
C. Other	.160/.098	.133/.201	.216/.188	.225/.062
D. Unclassified	.0/.0	.0/.017	.0/.007	.0/.0
2. Source of Information				
A. New Source	.345/.186	.444/.212	.594/.319	.325/.194
B. Previously Used Source	.641/.803	.555/.770	.396/.676	.675/.805
C. Unclassified	.012/.009	.0/.017	.009/.003	.0/.0
3. Class of Event				
A. Current Awareness	.222/.357	.333/.310	.315/.396	.225/.285
B. Specific Problem	.629/.617	.622/.574	.675/.592	.700/.605
C. Exhaustive Search	.123/.009	.022/.097	.0/.007	.075/.108
D. Unclassified	.024/.014	.022/.017	.009/.003	.0/.0
4. Document Used				
A. Journal or Reprint	.258/.397	.473/.487	.634/.283	.538/.462
B. Book or Monograph	.534/.238	.473/.141	.207/.251	.192/.137
C. Govt. or Private Report	.103/.034	.026/.102	.073/.141	.115/.225
D. Letter or Memo	.068/.125	.0/.089	.085/.165	.115/.100
E. Other	.034/.204	.026/.141	.0/.157	.038/.075
F. Unclassified	.0/.0	.0/.038	.0/.0	.0/.0
5. Information Resulted From				
A. Glancing Over	.258/.409	.368/.448	.341/.338	.269/.325
B. Initial Reading	.310/.250	.368/.371	.243/.322	.230/.262
C. Repeated Reading	.275/.295	.236/.128	.231/.165	.038/.175
D. Careful Study	.137/.045	.026/.012	.182/.173	.384/.237
E. Unclassified	.017/.0	.0/.038	.0/.0	.076/.0
6. Personal Contact				
A. Local Phone Call	.260/.120	.285/.052	.034/.052	.571/.094
B. Long Distance Phone Call	.086/.025	.0/.104	.034/.045	.0/.094
C. Face to Face	.608/.827	.714/.833	.931/.661	.428/.810
D. Other	.043/.017	.0/.010	.0/.240	.0/.0
E. Unclassified	.0/.0	.0/.031	.0/.0	.0/.0
7. Information Event Resulted From				
A. Brief Passing Comment	.043/.051	.0/.0	.0/.022	.071/.021
B. Short Conversation	.304/.568	.428/.447	.482/.368	.500/.452
C. Extended Conversation	.217/.267	.285/.427	.310/.300	.357/.389
D. Meeting of Three or More	.260/.103	.285/.125	.206/.308	.071/.136
E. Unclassified	.130/.008	.0/.031	.0/.0	.0/.0
8. Information Event Stimulus				
A. Information Requested By You	.592/.573	.755/.609	.666/.615	.750/.622
B. Provided Without Your Request	.271/.372	.200/.362	.324/.311	.200/.354
C. Other	.074/.019	.0/.0	.0/.003	.025/.005
D. Unclassified	.061/.034	.044/.028	.009/.065	.025/.017

INFORMATION EVENT CATEGORIES
(Documents and Personal Contact)

	EXPERIMENTAL		CONTROL	
	PRE	POST	PRE	POST
	NI/I	NI/I	NI/I	NI/I
I. Document Used				
A. Journal or Reprint	.185/.171	.400/.218	.468/.138	.350/.211
B. Book of Monograph	.382/.102	.400/.063	.153/.123	.125/.062
C. Govt. or Private Report	.074/.014	.022/.045	.054/.069	.075/.102
D. Letter or Memo	.049/.053	.0/.040	.063/.080	.075/.045
E. Other	.024/.088	.022/.063	.0/.076	.025/.034
F. Unclassified	.0/.0	.0/.017	.0/.0	.0/.0
II. Personal Contact				
A. Local Phone Call	.074/.068	.044/.028	.009/.026	.200/.051
B. Long Distance Phone Call	.024/.014	.0/.057	.009/.023	.0/.051
C. Face to Face	.172/.470	.111/.459	.243/.338	.150/.440
D. Other	.012/.009	.0/.005	.0/.123	.0/.0
E. Unclassified	.0/.0	.0/.017	.0/.0	.0/.0
$\Sigma P_r = 1.0/1.0 \quad 1.0/1.0 \quad 1.0/1.0 \quad 1.0/1.0$				

APPENDIX I
 INFORMATION EVENT CARD CUMULATIVE FREQUENCY DISTRIBUTION
 FREQUENCY OF ACTIVITY
 CARDS

□ - PRE-TREATMENT
 ▨ - POST-TREATMENT

ARGONNE LAB #1 - #42

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Activity	Pre-Treatment	Post-Treatment
1	7-13	7-27
2	7-13	7-27
3	7-16	7-19
4	7-16	7-19
5	7-16	7-19
6	7-16	7-19
7	7-16	7-19
8	7-16	7-19
9	7-16	7-19
10	7-16	7-19

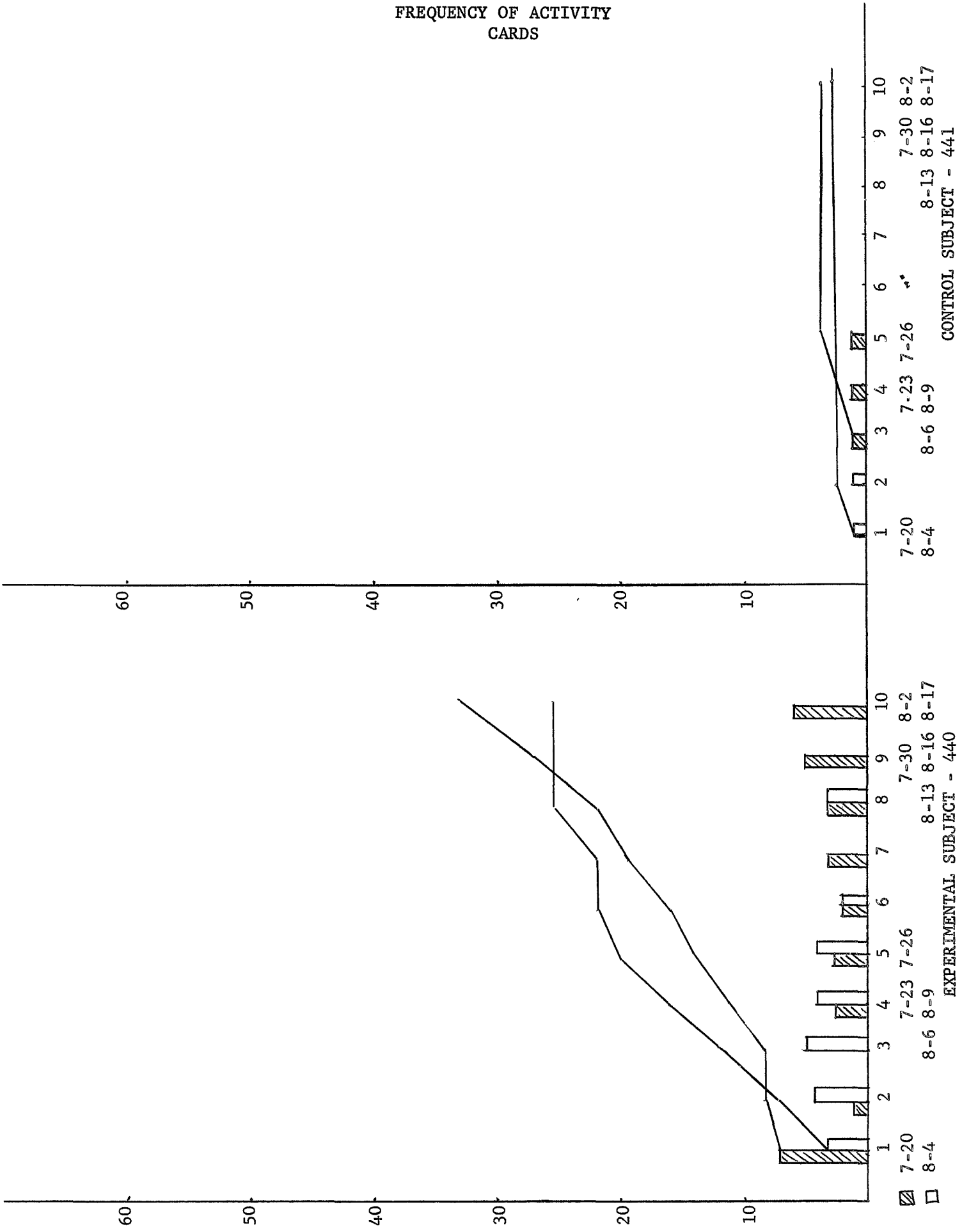
CONTROL SUBJECT - 421

EXPERIMENTAL SUBJECT -420

FREQUENCY OF ACTIVITY CARDS

▨ - PRE-TREATMENT
 □ - POST-TREATMENT

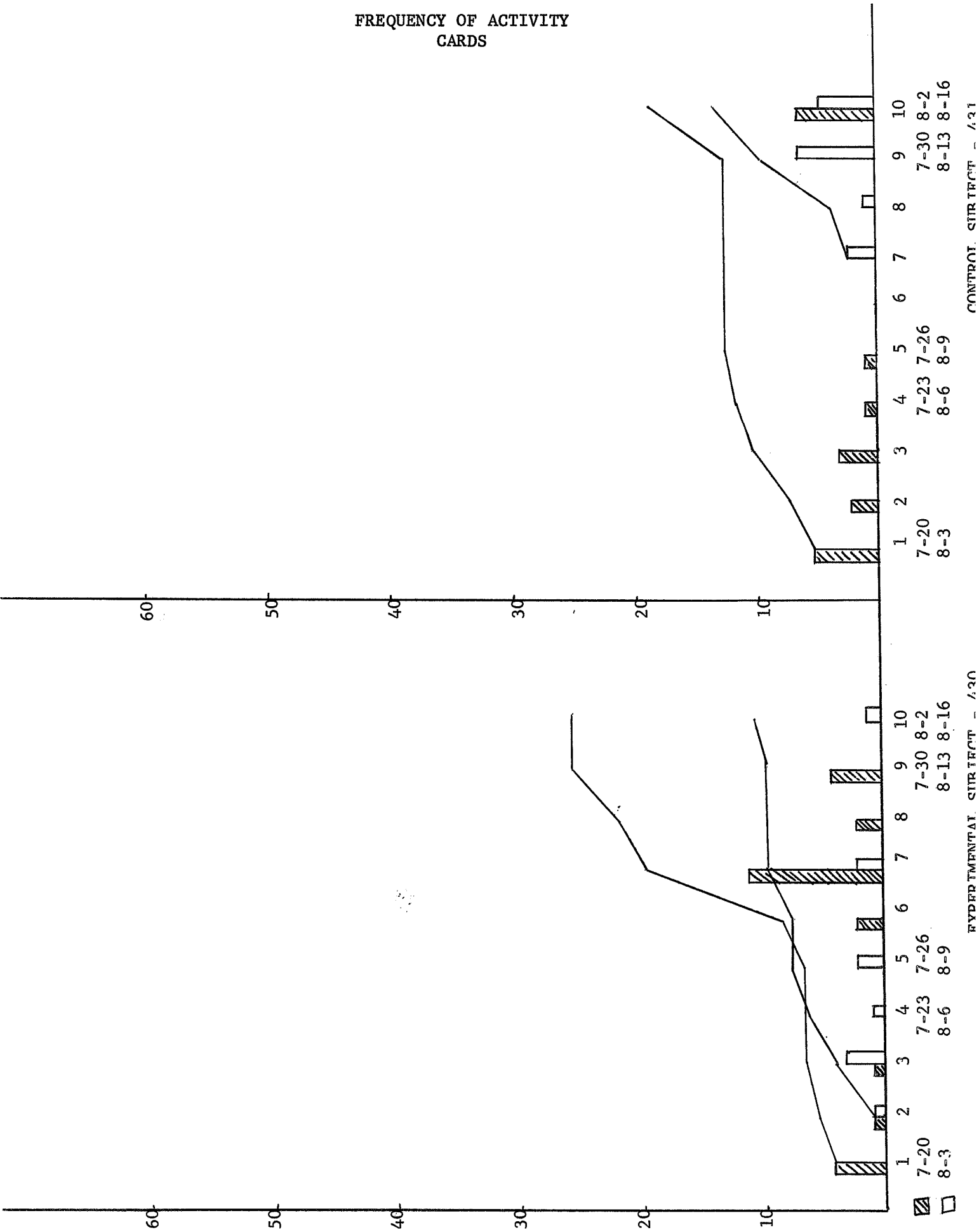
ARGONNE LAB #2 - #43



FREQUENCY OF ACTIVITY CARDS

☒ - PRE-TREATMENT
☐ - POST-TREATMENT

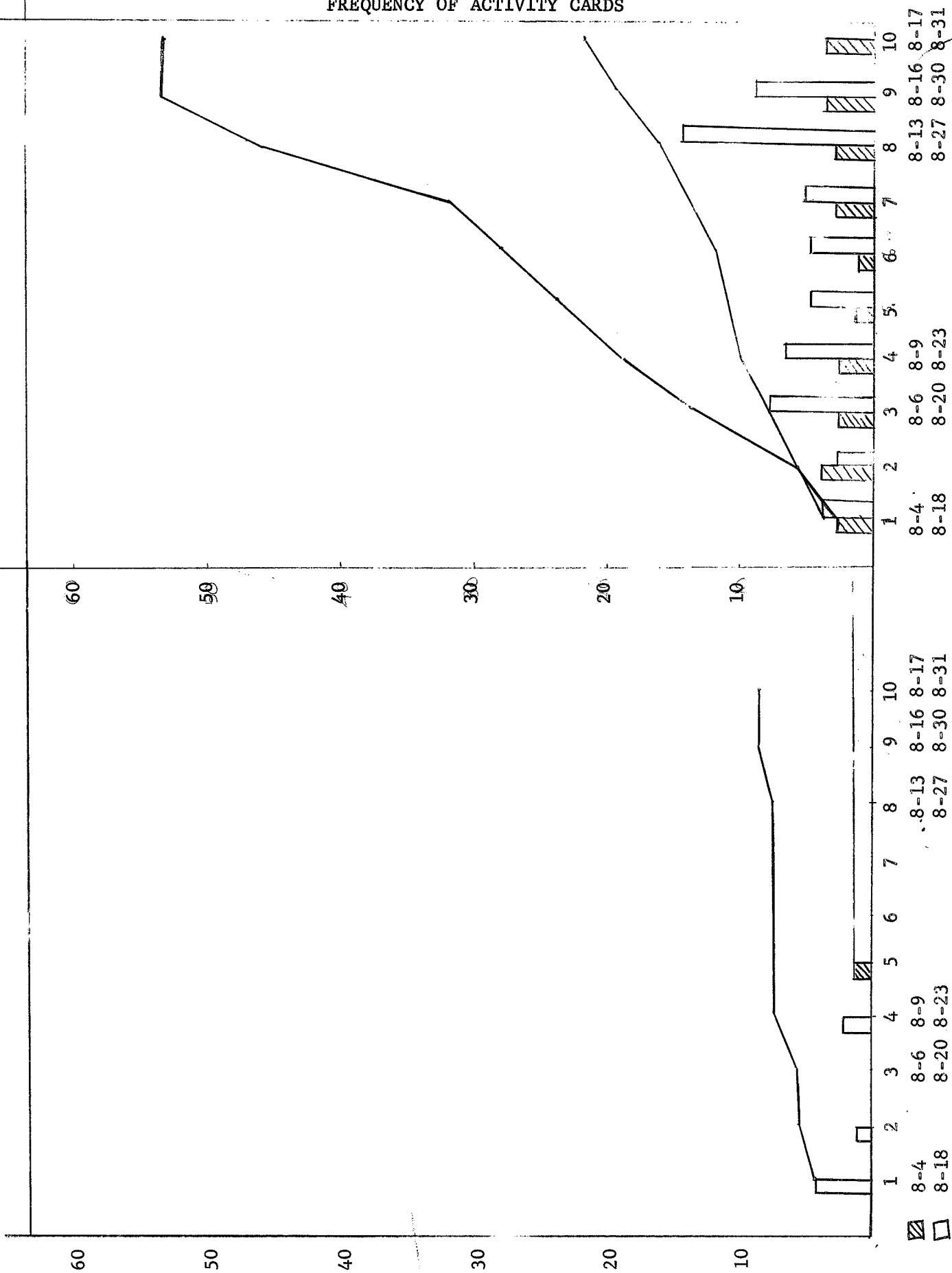
ITRI - #43



FREQUENCY OF ACTIVITY CARDS

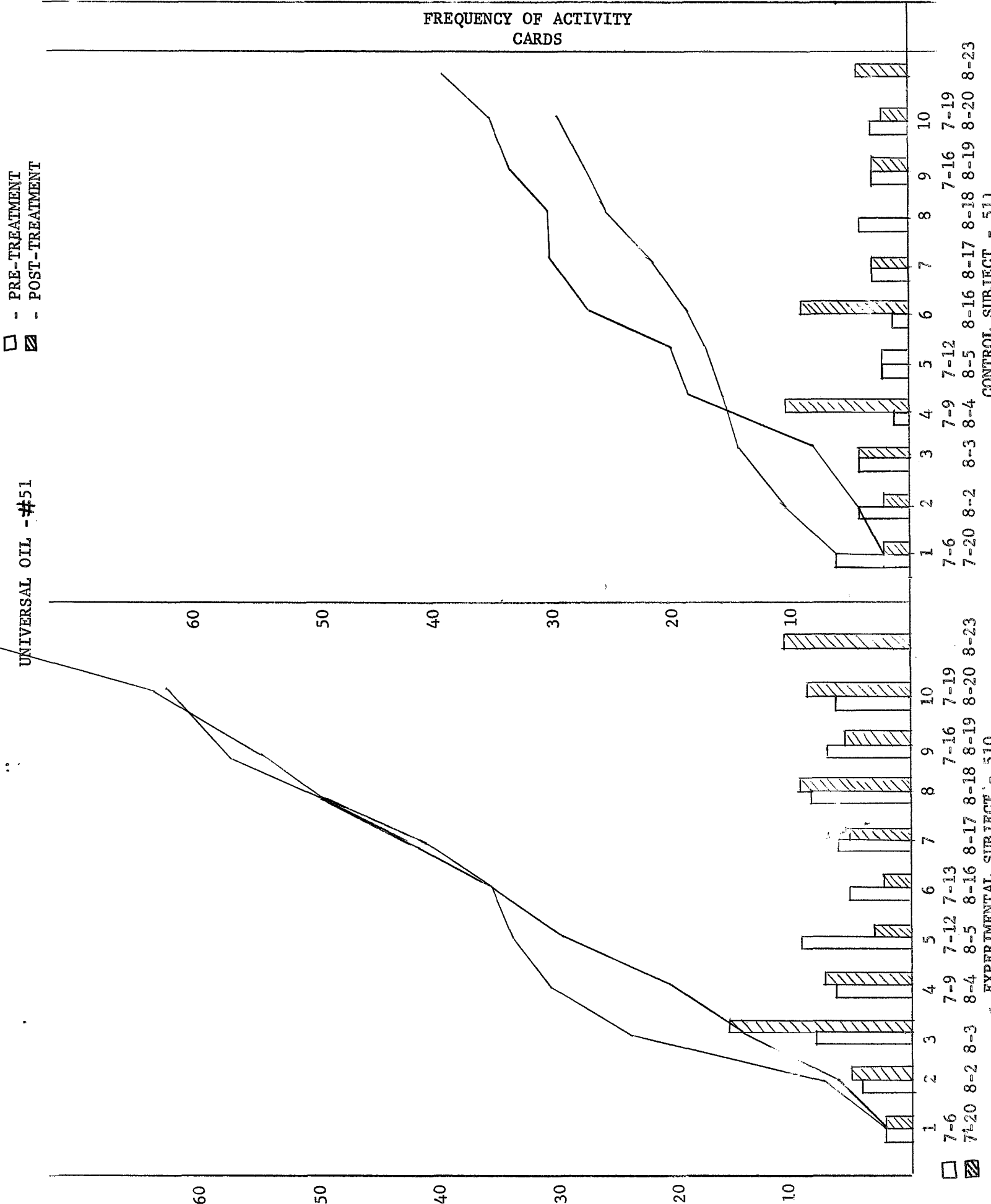
▨ - PRE-TREATMENT
 □ - POST-TREATMENT

ARGONNE LAB #3 - #45



EXPERIMENTAL SUBJECT - 450

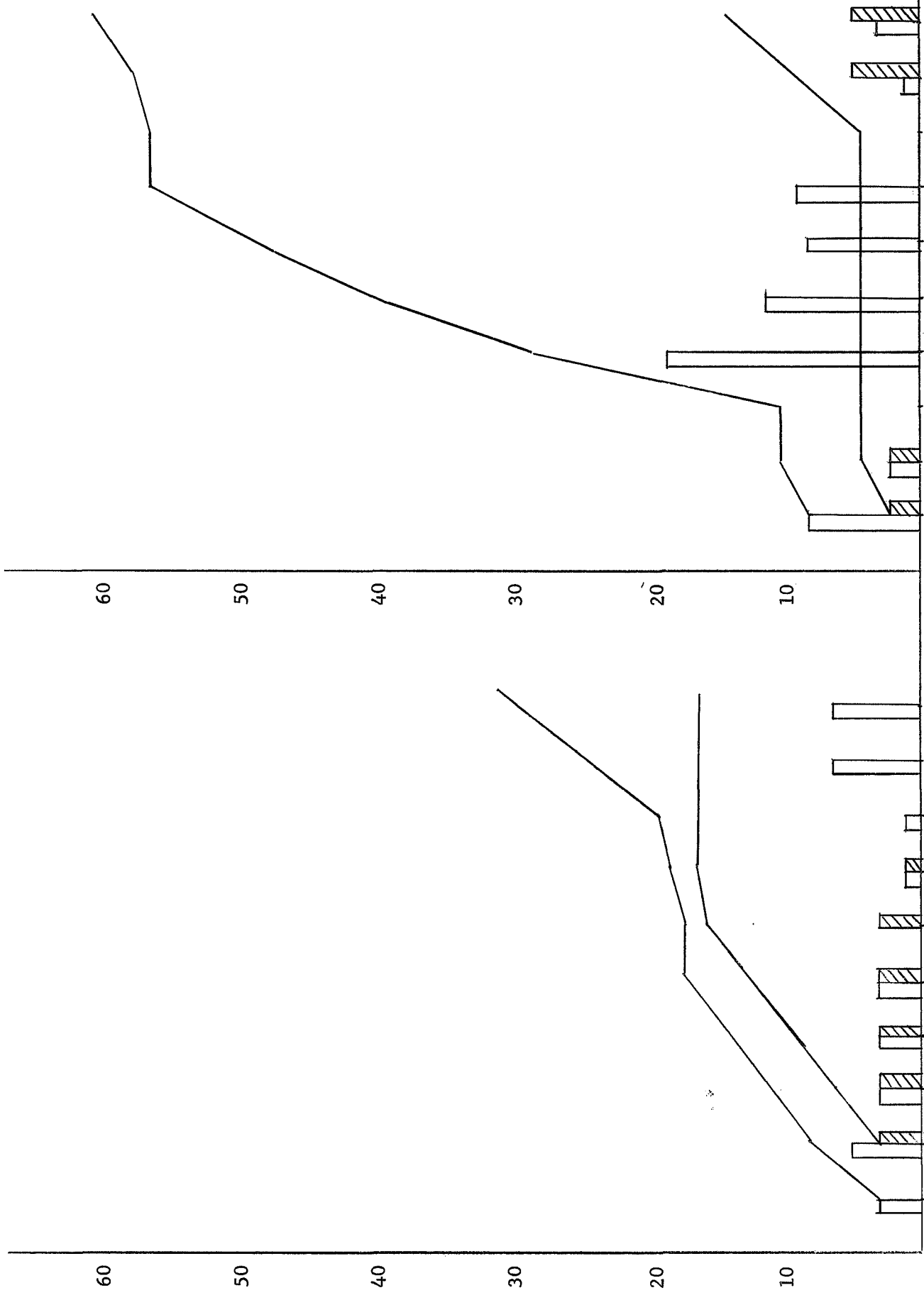
CONTROL SUBJECT 451



□ - PRE-TREATMENT
 ▨ - POST-TREATMENT

SINCLAIR - # 52

FREQUENCY OF ACTIVITY
CARDS



1 2 3 4 5 6 7 8 9 10
 7-14 7-15 7-16 7-26 7-30 8-2 8-3
 8-4 8-5 8-10 8-11 8-12 8-17 8-18 8-19 8-24 8-25

CONTROL SUBJECT - 521

□ 7-14 7-15 7-16 7-26 7-30 8-2 8-3
 ▨ 8-4 8-5 8-10 8-11 8-12 8-17 8-18 8-19 8-24 8-25

EXPERIMENTAL SUBJECT -520

FREQUENCY OF ACTIVITY CARDS

□ - PRE-TREATMENT
▨ - POST-TREATMENT

McCRONE - #53

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1 2 3 4 5 6 7 8 9 10
7-14 7-16 7-19 7-23 7-26 7-27
7-28 7-30 8-2 8-6 8-9 8-10

CONTROL SUBJECT - 531

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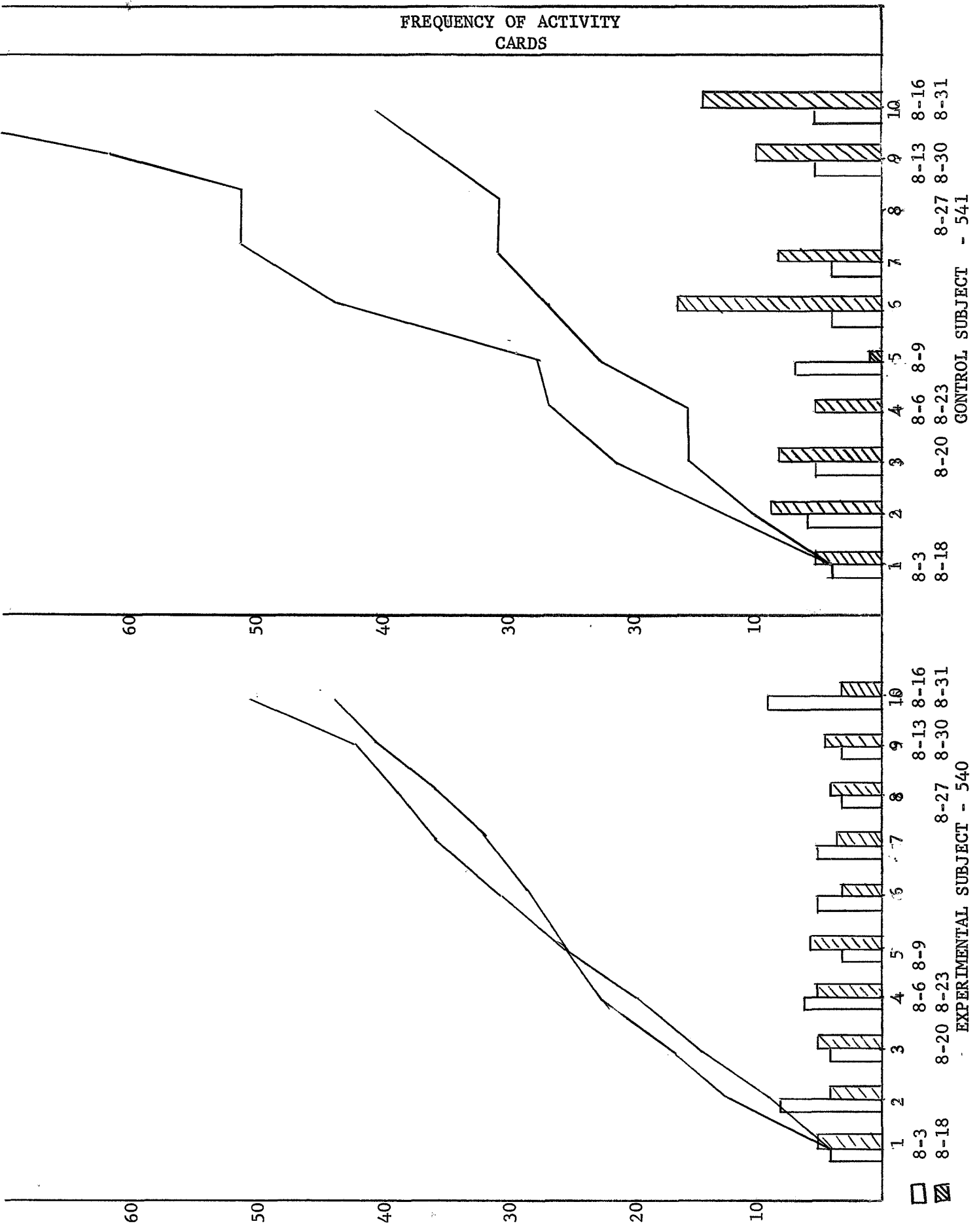
1 2 3 4 5 6 7 8 9 10
7-14 7-16 7-19 7-23 7-26 7-27
7-28 7-30 8-2 8-6 8-9 8-10

EXPERIMENTAL SUBJECT - 530

□ PRE-TREATMENT
 ▨ POST-TREATMENT

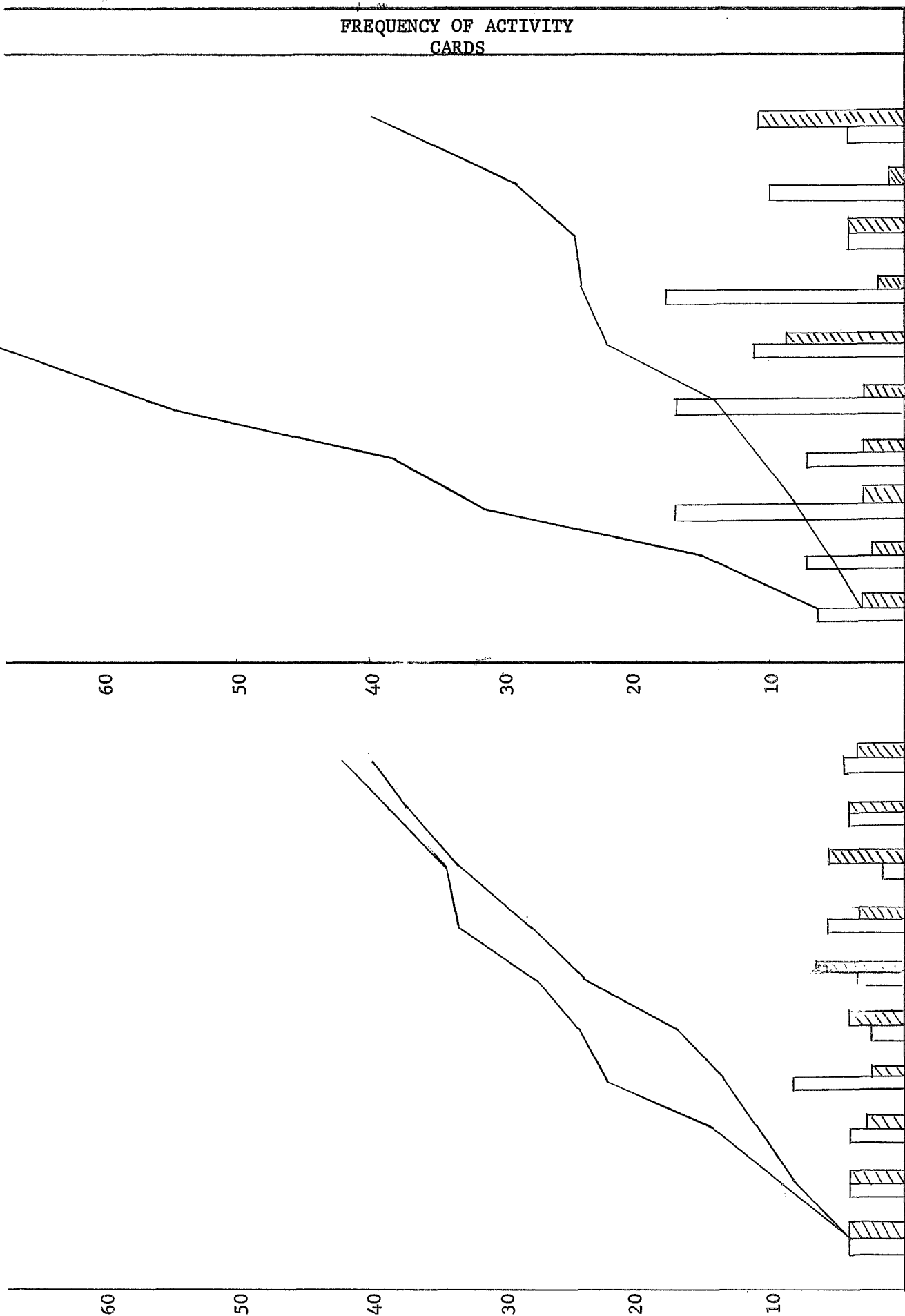
COMPANY E - #54

FREQUENCY OF ACTIVITY CARDS



□ - PRE-TREATMENT
 ▨ - POST-TREATMENT

SHERWIN WILLIAMS - #55



CONTROL SUBJECT - 551

EXPERIMENTAL SUBJECT - 550

APPENDIX J
INFORMATION SERVICE RESULTS

I.D. Code	Opened Service Number:							INFORMATION SERVICES		Top Two	Why Not Used Time
	Opened	1	2	3	4	5	6	7	Used	Wants to Continue	
420	7/4	✓	✓	has	has	✓	has	✓	7/0	2,3,4,6,7	6,7 Too Broad, No Time, Too General No Time
1	7/0	X	X	has	has	X	has	X	7/0	3,4,6	4,6
430	7/2	✓	✓	X	X	✓	✓	X	7/6	6	6 No Interest in some Not Much Time
1	NOT FORWARDED										
440	7/7	✓	✓	has	has	✓	✓	✓	7/0	3,4,5	3,5 No Need No Time
1	7/1	X	X	has	has	✓	X	X	7/0	3,4,6	4,6
450	7/7	✓	✓	✓	✓	✓	✓	✓	7/3	2,3,4,6,7	4,6 No Value
1	NOT FORWARDED										
510	7/6	✓	✓	✓	✓	X	has	✓	7/4	1,2,5,6,7	5,7 Used 4 services; others no value
1	DID NOT RECEIVE BECAUSE OF ILLNESS OF "TEST"										
520	7/4	✓	✓	X	X	X	✓	✓	7/1	2,5,6,7	6,7 No Need, No Time, Too General No Time Meant to look at
1	7/0	X	X	X	X	X	X	X	7/0		
530	7/2	✓	✓	X	X	X	X	X	7/0	1,2,5,6	2,5 Not enough time Time Rec'd late
1	7/1	✓	X	X	X	X	X	X	7/0	None	None
540	7/4	✓	✓	✓	✓	X	X	X	7/0	2,5,6	2,6 Not enough time No time but interested Will look at later
1	7/0	X	X	X	X	X	X	X	7/0		
550	7/7	✓	✓	✓	✓	✓	✓	✓	7/3	1,3,5,6,7	1,6 No Time No Time
1	7/7	✓	✓	✓	✓	✓	✓	✓	7/0		

NOTE: The word "has" signifies that the participant already has the service.

Please check the appropriate column(s) for each service

INFORMATION SERVICE	Heard of before this study	Heard of during this study	Never heard of at all	Used the service during this study
1. National Referral Center	()	()	()	()
2. NASA Info File Search	()	()	()	()
3. Argonne Laboratory Publications	()	()	()	()
4. Argonne Laboratory Library Acquisitions	()	()	()	()
5. <u>Current Contents</u>	()	()	()	()
6. Reprints of Crystallography Journals Contents	()	()	()	()
7. Copies of Dissertations from University Microfilm	()	()	()	()































FORM A

Please rate each service
in the order of
their value to you.

7. Copies of Dissertations from
University Microfilm

☐ ☐ ☐ ☐ ☐ ☐ ☐

☐ ☐ ☐ ☐ ☐ ☐ ☐

no value	intermediate	very val.
		
		
		
		
		
		
		
		
		
		

WORK ACTIVITIES

- () During Study
() Other Times

What are some of the kinds
of information you would
need for this activity

What are the information sources you
would use for information needed in this
activity (try for order of importance).